ĐẠI HỌC QUỐC GIA
THÀNH PHỐ HỒ CHÍ MINH
TRƯỜNG ĐẠI HỌC QUỐC TẾ

CỘNG HÒA XÃ HỘI CHỦ NGHĨA VIỆT NAM
Độc lập – Tự do – Hạnh phúc

CHƯƠNG TRÌNH ĐÀO TẠO KHÓA 2023 – NGÀNH CÔNG NGHỆ THÔNG TIN TRÌNH ĐỘ ĐẠI HỌC

(Kèm theo Quyết định số: 1139*/QĐ-ĐHQT ngày* 30 *tháng* 8 *năm 2023 của Hiệu trưởng trường Đại học Quốc tế)*

1. Thông tin chung

- Tên ngành đào tạo:
  + Tiếng Việt: Công nghệ Thông Tin (CNTT)
  + Tiếng Anh: Information Technology
- Mã ngành đào tạo: 7480201
- Trình độ đào tạo: Bậc Đại học, trình độ kỹ sư
- Loại hình đào tạo: Chính quy
- Thời gian đào tạo: 4,5 năm
- Tên văn bằng sau khi tốt nghiệp:
  + Tiếng Việt: Kỹ sư Công Nghệ Thông Tin
  + Tiếng Anh: Engineer in Information Technology
- Nơi đào tạo: trường Đại Học Quốc Tế (ĐHQT) - ĐH Quốc Gia Tp. Hồ Chí Minh

2. Thông tin tuyển sinh và kế hoạch đào tạo

a. Đối tượng tuyển sinh

Mọi công dân nước Cộng Hòa Xã Hội Chủ Nghĩa Việt Nam đủ điều kiện dự thi kỳ thi tuyển sinh quốc gia theo quy chế tuyển sinh đại học, cao đẳng hệ chính quy của Bộ Giáo dục và Đào tạo ban hành; dự thi đủ số môn quy định và đạt điểm trúng tuyển do trường Đại học Quốc Tế, Đại học Quốc Gia TP HCM quy định.

Các công dân nước ngoài hoặc công dân nước Cộng Hòa Xã Hội Chủ Nghĩa Việt Nam đang theo học các chương trình quốc tế được xét tuyển theo quy định của trường Đại học Quốc Tế, Đại học Quốc Gia TP HCM

b. Hình thức tuyển sinh

Theo các phương thức tuyển sinh đang thực hiện tại Trường ĐHQT hiện nay.

c. Tổ hợp môn xét tuyển: A (Toán, Lý, Hoá), A1(Toán, Lý, Anh)

3. Mục tiêu đào tạo

a. Mục tiêu chung: đào tạo kỹ sư CNTT có kiến thức cơ bản vững vàng, nắm vững các công nghệ tiên tiến trong lĩnh vực CNTT, trong môi trường học tập hiện đại. Kỹ sư CNTT tốt nghiệp có kỹ năng về CNTT chuyên nghiệp, có khả năng anh ngữ tốt trong môi trường làm việc, học tập và nghiên cứu quốc tế, có kỹ năng làm việc nhóm và trình bày hiệu quả. Chương trình đào tạo tuân thủ theo các quy định của Bộ GDĐT, ĐHQG TP.HCM và các chuẩn mực quốc tế.

Bảng 1. Sự phù hợp của mục tiêu đào tạo với Tầm nhìn, sứ mạng và Mục tiêu giáo dục của Luật giáo dục đại học.

Mục tiêu đào tạo của CTĐT	**Tầm nhìn**	**Sứ mạng (tô đậm những nội hàm mà mục tiêu thể hiện hoặc gắn kết)**	**Luật giáo dục (tô đậm những nội hàm mà mục tiêu thể hiện hoặc gắn kết)**
Ngành IT tại Khoa CNTT đào tạo kỹ sư CNTT có kiến thức cơ bản vững vàng, nắm vững các công nghệ tiên tiến trong lĩnh vực CNTT, trong môi trường học tập hiện đại. Kỹ sư CNTT tốt nghiệp có kỹ năng về CNTT chuyên nghiệp, có khả năng anh ngữ tốt trong môi trường làm việc, học tập và nghiên cứu quốc tế, có kỹ năng làm việc nhóm và trình bày hiệu quả. Chương trình đào tạo tuân thủ theo các quy định của Bộ GDĐT, ĐHQG TP.HCM và	Khoa CNTT là một trong các khoa của Trường Đại học Quốc tế, ĐHQG-TP.HCM. Do đó, tầm nhìn của Khoa phụ thuộc và tầm nhìn của Trường (**Trường ĐHQT là trường đại học nghiên cứu thuộc tốp đầu tại châu Á; là cơ sở giáo dục quốc tế, tự chủ, sáng tạo; là nơi vun đắp và phát triển nguồn nhân lực chất lượng cao cho thị trường lao động trong nước và quốc tế**.)	**Đào tạo chất lượng cao đa ngành – đa lĩnh vực cho bậc đại học và sau đại học. Tất cả các CTĐT được đánh giá theo tiêu chuẩn trong nước và quốc tế AUN.** **Nâng cao nghiên cứu cơ bản và nghiên cứu ứng dụng để đáp ứng được nhu cầu của doanh nghiệp, địa phương, xã hội và tiêu chuẩn quốc tế.** Đảm nhận vai trò tiên phong tại Việt Nam bằng cách thực hành quản lý xuất sắc, truyền cảm hứng và hỗ trợ các thành viên của ĐHQG TP.HCM	**Mục tiêu giáo dục nhằm phát triển toàn diện con người Việt Nam có đạo đức, tri thức, văn hóa**, sức khỏe, thẩm mỹ và nghề nghiệp; có phẩm chất, năng lực và ý thức công dân; có lòng yêu nước, tinh thần dân tộc, trung thành với lý tưởng độc lập dân tộc và chủ nghĩa xã hội; phát huy tiềm năng, **khả năng sáng tạo của mỗi cá nhân**; nâng cao dân trí, phát triển nguồn nhân lực, bồi dưỡng nhân tài, đáp ứng yêu cầu của sự nghiệp xây dựng, bảo vệ Tổ quốc và

các chuẩn mực quốc tế		trong việc phát triển toàn diện	hội nhập quốc tế (Điều 2)

b. Mục tiêu cụ thể (Program Objectives - POs): Kỹ sư CNTT sau khi tốt nghiệp tại ĐHQT có kiến thức, kỹ năng và năng lực như sau:

(**PO1**) Kiến thức và lập luận ngành

- kiến thức cơ bản vững chắc về máy tính, hệ thống máy tính, mạng máy tính và ứng dụng CNTT, bao gồm các khía cạnh lý thuyết và ứng dụng.
- kiến thức chuyên ngành sâu, rộng về máy tính, hệ thống máy tính, mạng máy tính và ứng dụng công nghệ thông tin; có kỹ năng phân tích và giải quyết vấn đề; thiết kế, phát triển và tích hợp hệ thống thông tin cho các ứng dụng kỹ thuật liên quan đến máy tính, hệ thống mạng máy tính và các ứng dụng và hệ thống dựa trên mạng máy tính; khả năng giải quyết các vấn đề kỹ thuật, xã hội, chính trị và kinh tế liên ngành.

(**PO2**) Kỹ năng và phẩm chất cá nhân

- kiến thức về hội nhập và khởi nghiệp; có ý thức bảo vệ môi trường, thiết kế và vận hành hệ thống thân thiện với môi trường.

(**PO3**) Kỹ năng làm việc nhóm và giao tiếp

- các kỹ năng mềm cần thiết và giải quyết vấn đề; có khả năng làm việc theo nhóm, kỹ năng lãnh đạo và quản lý; có khả năng giao tiếp và làm việc chuyên nghiệp bằng tiếng Anh (ở mức độ thành thạo).
- có ý thức về chuyên môn, đạo đức nghề nghiệp và tinh thần trách nhiệm đối với bản thân và xã hội; có phẩm chất chính trị tốt, sống và làm việc tuân thủ pháp luật của nhà nước Việt Nam.

(**PO4**) Năng lực thực hành nghề nghiệp

- khả năng tự học và nghiên cứu hoặc tham gia các khóa bồi dưỡng để nắm bắt công nghệ mới.
- có đủ năng lực học tiếp các chương trình cao hơn trong và ngoài nước.

4. Chuẩn đầu ra của chương trình đào tạo (Program Learning Outcomes –PLOs)

Cách tuyên bố mục tiêu theo hướng dẫn tại Điều 5, Chương II, Thông tư 17/2021/TT-BGDĐT). Thầy/Cô trình bày CĐR rõ ràng, đo được theo cấp độ tư duy và được sắp xếp theo các khối: kiến thức, kỹ năng, mức tự chủ và trách nhiệm theo Khung trình độ Quốc gia Việt Nam.

Danh sách 6 CĐR được xem xét trong chương trình đào tạo gồm:

(**PLO1**) khả năng áp dụng kiến thức, kỹ thuật, kỹ năng và các công cụ hiện đại của toán học, khoa học, kỹ thuật và công nghệ để giải quyết các vấn đề kỹ thuật thuộc chuyên ngành;

(**PLO2**) khả năng thiết kế các hệ thống, thành phần hoặc quy trình đáp ứng các nhu cầu cụ thể cho các vấn đề kỹ thuật trong chuyên ngành;

(**PLO3**) khả năng giao tiếp bằng văn bản, lời nói và đồ họa trong các môi trường kỹ thuật và phi kỹ thuật; và khả năng tìm kiếm và sử dụng tài liệu kỹ thuật phù hợp;

(**PLO4**) khả năng phân tích và diễn giải các kết quả để cải tiến quy trình;

(**PLO5**) khả năng hoạt động hiệu quả với tư cách là thành viên cũng như lãnh đạo trong các nhóm kỹ thuật;

(**PLO6**) khả năng tiến hành kiểm tra, đo đạt, và thử nghiệm hệ thống.

5. Ma trận giữa mục tiêu đào tạo và chuẩn đầu ra

CĐR sẽ gắn kết với mục tiêu cụ thể đã được xác định ở Mục 3.

Bảng 2. Mối quan hệ giữa CĐR của CTĐT và mục tiêu đào tạo

Mục tiêu giáo dục của chương trình	**PO1**	**PO2**	**PO3**	**PO4**
PLO 1	X			
PLO 2	X			X
PLO 3			X	
PLO 4		X		X
PLO 5			X	
PLO 6	X			X

6. Quy trình đào tạo, điều kiện tốt nghiệp

- Căn cứ Quyết định số 1342/QĐ-ĐHQG ngày 30 tháng 9 năm 2022 của Giám đốc Đại học Quốc gia Thành phố Hồ Chí Minh về việc ban hành Quy chế đào tạo trình độ đại học.
- Căn cứ Quyết định số 719/QĐ-ĐHQT ngày 06 tháng 12 năm 2021 của Hiệu trưởng trường Đại học Quốc tế về việc ban hành Quy chế đào tạo trình độ đại học theo hệ thống tín chỉ tại trường Đại học Quốc tế.

7. Thang điểm (theo thang điểm chính thức của trường)

Trường quy định thang điểm đánh giá kết quả học tập của người học (Quy chế đào tạo trình độ đại học theo hệ thống tín chỉ tại trường Đại học Quốc tế)

Bảng 3: Thang điểm

Xếp loại	Thang điểm 100	Thang điểm 10	Thang điểm 4	Thang điểm chữ
Đạt				
Xuất sắc	90≤ ĐTBTL ≤ 100	9,0 ≤ ĐTBTL ≤ 10	4,0	A+
Giỏi	80≤ ĐTBTL < 90	8,0 ≤ ĐTBTL < 9,0	3,5	A
Khá	70≤ ĐTBTL < 80	7,0≤ ĐTBTL < 8,0	3,0	B+
Trung bình khá	60≤ ĐTBTL < 70	6,0≤ ĐTBTL < 7,0	2,5	B
Trung bình	50≤ ĐTBTL < 60	5,0≤ ĐTBTL < 6,0	2,0	C
Không đạt				
Yếu	40 ≤ ĐTBTL < 50	4,0≤ ĐTBTL < 5,0	1,5	D+
Kém	30 ≤ ĐTBTL < 40	3,0≤ ĐTBTL < 4,0	1,0	D
	ĐTBTL < 30	ĐTBTL < 3,0	0,0	F

Quy chế đào tạo theo học chế tín chỉ trên cơ sở các quyết định, nghị định hướng dẫn của Bộ GĐDT, ĐHQG TPHCM và ĐHQT:

- Văn bản hợp nhất số 17/VBHN-BGDĐT ngày 15/5/2014 của Bộ Giáo dục và Đào tạo về Văn bản hợp nhất Quyết định số 43/2007/QĐ-BGDĐT ngày 15/08/2007 và Thông tư số 57/2012/TT-BGDĐT ngày 27/12/2012 về việc ban hành quy chế đào tạo đại học và cao đẳng hệ chính quy theo hệ thống tín chỉ
- Văn bản hướng dẫn của ĐHQG-HCM (Công văn số 85/ĐHQG-ĐH ngày 15/01/2020 của Giám Đốc ĐHQG TPHCM về việc rà soát cập nhật chương trình đào tạo các ngành đào tạo chuyên sâu đặc thù trình độ đại học tại ĐHQG-HCM năm 2020)

- Quy chế đào tạo theo học chế tín chỉ - bậc đại học do Hiệu Trưởng Trường Đại học Quốc Tế, Đại học Quốc Gia TP HCM ban hành.

8. Khối lượng kiến thức toàn khoá

Ngành Công nghệ Thông Tin có 2 chuyên ngành: **kỹ sư Kỹ Thuật Mạng (150 tín chỉ) và kỹ sư Kỹ Thuật máy tính (150 tín chỉ)**. Phân bổ kiến thức cho 02 chuyên ngành như sau (không bao gồm giáo dục thể chất và giáo dục quốc phòng):

TT	Các khối kiến thức	Số tín chỉ	%	Số tín chỉ	%
		Kỹ Thuật Mạng		**Kỹ Thuật Máy Tính**	
1	Khối kiến thức giáo dục đại cương	49	32.7	49	32.7
2	Khối kiến thức cơ sở ngành	35	23.3	35	23.3
3	Kiến thức chuyên ngành (tính cả khối kiến thức tự chọn)	44	29.3	44	29.3
4	Kiến thức bổ trợ	6	4	6	4
5	Thực tập, khóa luận/luận văn tốt nghiệp	16	10.7	16	10.7
	Tổng cộng	**150**	**100**	**150**	**100**

9. Nội dung chương trình đào tạo

9.1. Chuyên ngành Kỹ Thuật Mạng

STT	Mã môn học	Tên môn học (MH)		Loại MH (bắt buộc /tự chọn)	Tín chỉ			Phòng thí nghiệm (TN)
		Tiếng Việt	**Tiếng Anh**		**Tổng cộng**	**Lý thuyết**	**Thực hành/ Thí nghiệm**	
I	**Kiến thức giáo dục đại cương**				**49**	**48**	**1**	

I.1	***Các môn lý luận chính trị***				**11**	**11**	**0**	
1	PE015IU	Triết học Mác-Lênin	Philosophy Marx - Lenin	Bắt buộc	3	3	0	
2	PE016IU	Kinh tế chính trị Mác-Lênin	Marxist – Leninist Political Economy	Bắt buộc	2	2	0	
3	PE017IU	Chủ nghĩa xã hội khoa học	Scientific Socialism	Bắt buộc	2	2	0	
4	PE018IU	Lịch sử Đảng Cộng Sản Việt Nam	History of Vietnamese Communist Party	Bắt buộc	2	2	0	
5	PE019IU	Tư tưởng Hồ Chí Minh	Ho Chi Minh's Thoughts	Bắt buộc	2	2	0	
I.2	***Khoa học xã hội - Nhân văn - Nghệ thuật***				***3***	***3***	***0***	
6	PE021IU	Pháp luật đại cương	General Law	Bắt Buộc	3	3	0	
I.3	***Ngoại ngữ***				***8***	***8***	***0***	
7	EN008IU	Tiếng Anh chuyên ngành 1 (kỹ năng nghe)	Academic English 1 (listening skill)	Bắt buộc	2	2	0	
8	EN007IU	Tiếng Anh chuyên ngành 1 (kỹ năng viết)	Academic English 1 (writing skill)	Bắt buộc	2	2	0	
9	EN012IU	Tiếng Anh chuyên ngành 2 (kỹ năng nói)	Academic English 2 (speaking skill)	Bắt buộc	2	2	0	
10	EN011IU	Tiếng Anh chuyên ngành 2 (kỹ năng viết)	Academic English 2 (writing skill)	Bắt buộc	2	2	0	
I.4	***Toán - Khoa học tự nhiên - Môi trường***				***27***	***26***	***1***	
11	MA001IU	Toán 1	Calculus 1	Bắt buộc	4	4	0	
12	MA003IU	Toán 2	Calculus 2	Bắt buộc	4	4	0	
13	IT154IU	Đại số tuyến tính	Linear algebra	Bắt buộc	3	3	0	
14	MA026IU	Xác suất, thống kê và quá trình ngẫu nhiên	Probability, Statistic & Random Process	Bắt buộc	3	3	0	
15	IT153IU	Toán rời rạc	Discrete Mathematics	Bắt buộc	3	3	0	
16	PH013IU	Vật lý 1	Physics 1	Bắt buộc	2	2	0	
17	PH014IU	Vật lý 2	Physics 2	Bắt buộc	2	2	0	

18	PH015IU	Vật lý 3	Physics 3	Bắt buộc	3	3	0	
19	PH016IU	Thực hành Vật lý 3	Physics 3 Laboratory	Bắt buộc	1	0	1	Phòng TN. Vật lý
20	PH012IU	Vật lý 4	Physics 4	Bắt buộc	2	2	0	
II	**Kiến thức cơ sở ngành**				**35**	**27**	**8**	
21	IT064IU	Nhập môn Tin học	Introduction to Computing	Bắt buộc	3	3	0	
22	IT116IU	Lập trình C/C++	C/C++ Programming	Bắt buộc	4	3	1	Phòng TN. CNTT
23	IT067IU	Thiết kế logic số	Digital Logic Design	Bắt buộc	3	3	0	
24	IT099IU	Thực hành Thiết kế logic số	Digital Logic Design Laboratory	Bắt buộc	1	0	1	Phòng TN. CNTT
25	IT069IU	Lập trình hướng đối tượng	Object-Oriented Programming	Bắt buộc	4	3	1	Phòng TN. CNTT
26	IT013IU	Cấu trúc dữ liệu và giải thuật	Algorithms and Data Structures	Bắt buộc	4	3	1	Phòng TN. CNTT
27	IT091IU	Mạng máy tính	Computer Networks	Bắt buộc	4	3	1	Phòng TN. CNTT
28	IT017IU	Hệ điều hành	Operating System	Bắt buộc	4	3	1	Phòng TN. CNTT
29	IT089IU	Cấu trúc máy tính	Computer Architecture	Bắt buộc	4	3	1	Phòng TN. CNTT
30	IT079IU	Nguyên lý Quản trị Cơ sở dữ liệu	Principles of Database Management	Bắt buộc	4	3	1	Phòng TN. CNTT
III	**Kiến thức chuyên ngành**				**44**	**33**	**11**	
III. 1	***Kiến thức bắt buộc***				***32***	***24***	***8***	
31	IT096IU	Lập trình Mạng	Net-Centric Programming	Bắt buộc	4	3	1	Phòng TN. CNTT
32	IT094IU	Quản lý hệ thống thông tin	Information System Management	Bắt buộc	4	3	1	Phòng TN. CNTT
33	IT093IU	Phát triển ứng dụng Web	Web Application Development	Bắt buộc	4	3	1	Phòng TN. CNTT

34	IT117IU	Bảo mật hệ thống và mạng	System and Network Security	Bắt Buộc	4	3	1	Phòng TN. CNTT
35	IT125IU	Quản trị hệ thống mạng	System and Network Administration	Bắt Buộc	4	3	1	Phòng TN. CNTT
36	IT139IU	Tính toán phân tán	Scalable and Distributed Computing	Bắt Buộc	4	3	1	Phòng TN. CNTT
37	IT134IU	Internet vạn vật	Internet of Things	Bắt Buộc	4	3	1	Phòng TN. CNTT
38	IT159IU	Trí thông minh nhân tạo	Artificial Intelligent	Bắt Buộc	4	3	1	
III. 2	***Kiến thức ngành tự chọn (sinh viên chọn tối thiểu 16 tín chỉ trong nhóm môn học sau)***				***12***	***9***	***3***	
39		Tự chọn 1	Elective 1	Tự chọn	4	3	1	
40		Tự chọn 2	Elective 2	Tự chọn	4	3	1	
41		Tự chọn 3	Elective 3	Tự chọn	4	3	1	
IV	**Kiến thức bổ trợ**				**6**	**6**	**0**	
42	PE020IU	Đạo đức và kỹ năng nghề nghiệp	Engineering Ethics and Professional Skills	Bắt Buộc	3	3	0	
43	IT120IU	Khởi nghiệp	Entrepreneurship	Bắt buộc	3	3	0	
V	**Thực tập, khóa luận/luận văn tốt nghiệp**				**16**	**0**	**16**	
44	IT082IU	Thực tập công nghiệp	Internship	Bắt buộc	3	0	3	
45	IT083IU	Thực tập tốt nghiệp	Special Study of the Field	Bắt buộc	3	0	3	
46	IT058IU	Luận văn tốt nghiệp	Thesis	Bắt buộc	10	0	10	
	Tổng số (tín chỉ)				**150**	**114**	**36**	

Các môn tự chọn của kỹ thuật mạng

STT	**Mã môn học**	**Tên môn học (MH)**			**Tín chỉ**			
		Tiếng Việt	**Tiếng Anh**		**Tổng cộng**	**Lý thuyết**	**Thực hành**	
1	IT163IU	Tối ưu hóa và ứng dụng	Optimization and Applications	tự chọn	4	3	1	Phòng TN.CNTT

2	IT024IU	Đồ hoạ Máy tính	Computer Graphics	tự chọn	4	3	1	Phòng TN. CNTT
3	IT045IU	Thiết kế và đánh giá mạng	Network Design and Evaluation	tự chọn	4	3	1	Phòng TN. CNTT
4	IT056IU	Quản lý dự án CNTT	IT Project Management	tự chọn	4	3	1	Phòng TN. CNTT
5	IT068IU	Các nguyên lý mạch điện 1	Principles of Electrical Engineering I	tự chọn	3	3	0	Phòng TN. CNTT
6	IT074IU	Linh kiện điện tử	Electronics Devices	tự chọn	3	3	0	
7	IT076IU	Công nghệ Phần mềm	Software Engineering	tự chọn	4	3	1	Phòng TN. CNTT
8	IT090IU	Phân tích và thiết kế hướng đối tượng	Object-Oriented Analysis and Design	tự chọn	4	3	1	Phòng TN. CNTT
9	IT092IU	Nguyên lý của Ngôn ngữ lập trình	Principles of Programming Languages	tự chọn	4	3	1	Phòng TN. CNTT
10	IT098IU	Thực hành các nguyên lý mạch điện 1	Principles of Electrical Engineering I Laboratory	tự chọn	1	0	1	Phòng TN. CNTT
11	IT101IU	Thực hành linh kiện điện tử	Electronics Devices Laboratory	tự chọn	1	0	1	Phòng TN. CNTT
12	IT103IU	Xử lý tín hiệu số	Digital Signal Processing	tự chọn	4	3	1	Phòng TN. CNTT
13	IT105IU	Thiết kế hệ thống số	Digital System Design	tự chọn	3	3	0	
14	IT106IU	Thực hành thiết kế hệ thống số	Digital System Design Laboratory	tự chọn	1	0	1	Phòng TN. CNTT

15	IT110IU	Khái niệm thiết kế VLSI	Concepts in VLSI Design	tự chọn	3	3	0	Phòng TN. CNTT
16	IT126IU	Thực hành khái niệm thiết kế VLSI	Concepts in VLSI Design Laboratory	tự chọn	1		1	Phòng TN. CNTT
17	IT122IU	Nhập môn mạng không dây	Introduction to Wireless Network	tự chọn	4	3	1	Phòng TN. CNTT
18	IT114IU	Kiến trúc phần mềm	Software Architecture	tự chọn	4	3	1	Phòng TN. CNTT
19	IT115IU	Hệ thống nhúng	Embedded Systems	tự chọn	3	3	0	Phòng TN. CNTT
20	IT127IU	Thực hành hệ thống nhúng	Embedded Systems Laboratory	tự chọn	1	0	1	
21	IT128IU	Hệ thống vi xử lý	Micro-processing Systems	tự chọn	3	3	0	
22	IT129IU	Thực hành hệ thống vi xử lý	Micro-processing Systems Laboratory	tự chọn	1	0	1	Phòng TN. CNTT
23	IT130IU	Xử lý ảnh Kỹ thuật số	Digital Image Processing	tự chọn	4	3	1	Phòng TN. CNTT
24	IT160IU	Khai thác dữ liệu	Data Mining	tự chọn	4	3	1	Phòng TN.CNTT
25	IT133IU	Phát triển ứng dụng di động	Mobile Application Development	tự chọn	4	3	1	Phòng TN. CNTT
26	IT138IU	Trực quan hóa dữ liệu	Data Science and Data Visualization	tự chọn	4	3	1	Phòng TN.CNTT
27	IT140IU	Khái niệm cơ bản về bảo mật dữ liệu	Fundamental Concepts of Data Security	tự chọn	4	3	1	Phòng TN.CNTT
28	IT143IU	Công nghệ dữ liệu lớn	Big Data Technology	tự chọn	4	3	1	Phòng TN.CNTT

29	IT144IU	Phân Tích Quy Trình Nghiệp Vụ	Business Process Analysis	tự chọn	4	3	1	Phòng TN.CNTT
30	IT145IU	Hệ Thống Hỗ Trợ Quyết Định	Decision Support Systems	tự chọn	4	3	1	Phòng TN.CNTT
31	IT164IU	Điện Toán Đám Mây	Cloud Computing	tự chọn	4	3	1	Phòng TN.CNTT
32	IT150IU	Chuỗi khối	Blockchain	tự chọn	4	3	1	Phòng TN. CNTT
33	IT156IU	Phát triển và vận hành liên tục	Development & Operation (DevOps)	tự chọn	4	3	1	Phòng TN. CNTT
34	IT157IU	Học sâu	Deep Learning	tự chọn	4	3	1	Phòng TN. CNTT
35	IT158IU	Thiết kế và đánh giá giao diện	UI Design and Evaluation	tự chọn	4	3	1	Phòng TN. CNTT
36	IT166IU	Kiểm tra chất lượng phần mềm	Software Quality Verification and Validation	tự chọn	4	3	1	Phòng TN. CNTT
37	IT167IU	Phát triển ứng dụng game	Game Application Development	tự chọn	4	3	1	Phòng TN. CNTT
38	PE008IU	Tư Duy Phản Biện	Critical Thinking	tự chọn	3	3	0	Phòng TN.CNTT
39	IT131IU	Mô hình Toán cho Tin học	Theoretical Models in Computing	tự chọn	4	3	1	Phòng TN. CNTT
40		Tự chọn tự do	Free elective	tự chọn	4	3	1	

9.2. Chuyên ngành Kỹ thuật Máy tính

STT	Mã môn học	Tên môn học (MH)	Loại MH (bắt buộ	Tín chỉ	Phòng thí nghiệm (TN)

		Tiếng Việt	Tiếng Anh	c /tự chọn)	Tổng cộng	Lý thuyết	Thực hành/ Thí nghiệm	
I	**Kiến thức giáo dục đại cương**				**49**	**48**	**1**	
I.1	***Các môn lý luận chính trị***				***11***	***11***	***0***	
1	PE015IU	Triết học Mác-Lênin	Philosophy Marx - Lenin	Bắt buộc	3	3	0	
2	PE016IU	Kinh tế chính trị Mác-Lênin	Marxist – Leninist Political Economy	Bắt buộc	2	2	0	
3	PE017IU	Chủ nghĩa xã hội khoa học	Scientific Socialism	Bắt buộc	2	2	0	
4	PE018IU	Lịch sử Đảng Cộng Sản Việt Nam	History of Vietnamese Communist Party	Bắt buộc	2	2	0	
5	PE019IU	Tư tưởng Hồ Chí Minh	Ho Chi Minh's Thoughts	Bắt buộc	2	2	0	
I.2	***Khoa học xã hội - Nhân văn - Nghệ thuật***				***3***	***3***	***0***	
7	PE021IU	Pháp luật đại cương	General Law	Bắt Buộc	3	3	0	
I.3	*Ngoại ngữ*				*8*	*8*	*0*	
8	EN008IU	Tiếng Anh chuyên ngành 1 (kỹ năng nghe)	Academic English 1 (listening skill)	Bắt buộc	2	2	0	
9	EN007IU	Tiếng Anh chuyên ngành 1 (kỹ năng viết)	Academic English 1 (writing skill)	Bắt buộc	2	2	0	
10	EN012IU	Tiếng Anh chuyên ngành 2 (kỹ năng nói)	Academic English 2 (speaking skill)	Bắt buộc	2	2	0	

11	EN011IU	Tiếng Anh chuyên ngành 2 (kỹ năng viết)	Academic English 2 (writing skill)	Bắt buộc	2	2	0	
I.4	***Toán - Khoa học tự nhiên - Môi trường***				***27***	***26***	***1***	
12	MA001IU	Toán 1	Calculus 1	Bắt buộc	4	4	0	
13	MA003IU	Toán 2	Calculus 2	Bắt buộc	4	4	0	
14	MA026IU	Xác suất, thống kê và quá trình ngẫu nhiên	Probability, Statistic & Random Process	Bắt buộc	3	3	0	
15	IT153IU	Toán rời rạc	Discrete Mathematics	Bắt buộc	3	3	0	
16	IT154IU	Đại số tuyến tính	Linear algebra	Bắt buộc	3	3	0	
17	PH013IU	Vật lý 1	Physics 1	Bắt buộc	2	2	0	
18	PH014IU	Vật lý 2	Physics 2	Bắt buộc	2	2	0	
19	PH015IU	Vật lý 3	Physics 3	Bắt buộc	3	3	0	
20	PH016IU	Thực hành Vật lý 3	Physics 3 Laboratory	Bắt buộc	1	0	1	Phòng TN. Vật lý
21	PH012IU	Vật lý 4	Physics 4	Bắt buộc	2	2	0	
II	**Khối kiến thức cơ sở ngành**				**35**	**27**	**8**	
22	IT064IU	Nhập môn Tin học	Introduction to Computing	Bắt buộc	3	3	0	
23	IT116IU	Lập trình C/C++	C/C++ Programming	Bắt buộc	4	3	1	Phòng TN. CNTT
24	IT067IU	Thiết kế logic số	Digital Logic Design	Bắt buộc	3	3	0	
25	IT099IU	Thực hành Thiết kế logic số	Digital Logic Design Laboratory	Bắt buộc	1	0	1	Phòng TN. ĐTVT
26	IT069IU	Lập trình hướng đối tượng	Object-Oriented Programming	Bắt buộc	4	3	1	Phòng TN. CNTT

27	IT013IU	Cấu trúc dữ liệu và giải thuật	Algorithms and Data Structures	Bắt buộc	4	3	1	Phòng TN. CNTT
28	IT091IU	Mạng máy tính	Computer Networks	Bắt buộc	4	3	1	Phòng TN. CNTT
29	IT017IU	Hệ điều hành	Operating System	Bắt buộc	4	3	1	Phòng TN. CNTT
30	IT089IU	Cấu trúc máy tính	Computer Architecture	Bắt buộc	4	3	1	Phòng TN. CNTT
31	IT079IU	Nguyên lý Quản trị Cơ sở dữ liệu	Principles of Database Management	Bắt buộc	4	3	1	Phòng TN. CNTT
III	**Kiến thức chuyên ngành**				**44**	**33**	**11**	
III. 1	***Kiến thức bắt buộc***				***36***	***27***	***9***	
32	IT068IU	Các nguyên lý mạch điện 1	Principles of Electrical Engineering I	Bắt buộc	3	3	0	
33	IT098IU	Thực hành các nguyên lý mạch điện 1	Principles of Electrical Engineering I Laboratory	Bắt buộc	1	0	1	Phòng TN. CNTT
34	IT074IU	Linh kiện điện tử	Electronics Devices	Bắt buộc	3	3	0	
35	IT101IU	Thực hành linh kiện điện tử	Electronics Devices Laboratory	Bắt buộc	1	0	1	Phòng TN. CNTT
36	IT105IU	Thiết kế hệ thống số	Digital System Design	Bắt buộc	3	3	0	
37	IT106IU	Thực hành thiết kế hệ thống số	Digital System Design Laboratory	Bắt buộc	1	0	1	Phòng TN. CNTT
38	IT115IU	Hệ thống nhúng	Embedded Systems	Bắt buộc	3	3	0	
39	IT127IU	Thực hành hệ thống nhúng	Embedded Systems Laboratory	Bắt buộc	1	0	1	Phòng TN. CNTT
40	IT128IU	Hệ thống vi xử lý	Micro-processing Systems	Bắt buộc	3	3	0	

41	IT129IU	Thực hành hệ thống vi xử lý	Micro-processing Systems Laboratory	Bắt buộc	1	0	1	Phòng TN. CNTT
42	IT110IU	Khái niệm thiết kế VLSI	Concepts in VLSI Design	Bắt buộc	3	3	0	Phòng TN. CNTT
43	IT126IU	Thực hành khái niệm thiết kế VLSI	Concepts in VLSI Design Laboratory	Bắt buộc	1		1	Phòng TN. CNTT
44	IT103IU	Xử lý tín hiệu số	Digital Signal Processing	Bắt buộc	4	3	1	Phòng TN. CNTT
45	IT134IU	Internet vạn vật	Internet of Things	Bắt Buộc	4	3	1	Phòng TN. CNTT
46	IT159IU	Trí thông minh nhân tạo	Artificial Intelligence	Bắt Buộc	4	3	1	
III.2	***Kiến thức ngành tự chọn (sinh viên chọn tối thiểu 8 tín chỉ trong nhóm môn học sau)***				***8***	***6***	***2***	
47		Tự chọn 1	Elective 1	Tự chọn	4	3	1	
48		Tự chọn 2	Elective 2	Tự chọn	4	3	1	
IV	**Kiến thức bổ trợ**				**6**	**6**	**0**	
6	PE020IU	Đạo đức và kỹ năng nghề nghiệp	Engineering Ethics and Professional Skills	Bắt Buộc	3	3	0	
49	IT120IU	Khởi nghiệp	Entrepreneurship	Bắt buộc	3	3	0	
V	**Thực tập, khóa luận/luận văn tốt nghiệp**				**16**	**0**	**16**	
50	IT082IU	Thực tập công nghiệp	Internship	Bắt buộc	3	0	3	
51	IT083IU	Thực tập tốt nghiệp	Special Study of the Field	Bắt buộc	3	0	3	
52	IT058IU	Luận văn tốt nghiệp	Thesis	Bắt buộc	10	0	10	
	Tổng số (tín chỉ)				150	114	36	

CÁC MÔN TỰ CHỌN CỦA KỸ THUẬT MÁY TÍNH

STT	Mã môn học	Tên môn học (MH)			Tín chỉ			
		Tiếng Việt	Tiếng Anh		Tổng cộng	Lý thuyết	Thực hành	
1	IT163IU	Tối ưu hóa và ứng dụng	Optimization and Applications	tự chọn	4	3	1	Phòng TN.CNTT
2	IT024IU	Đồ hoạ Máy tính	Computer Graphics	tự chọn	4	3	1	Phòng TN. CNTT
3	IT045IU	Thiết kế và đánh giá mạng	Network Design and Evaluation	tự chọn	4	3	1	Phòng TN. CNTT
4	IT056IU	Quản lý dự án CNTT	IT Project Management	tự chọn	4	3	1	Phòng TN. CNTT
5	IT076IU	Công nghệ Phần mềm	Software Engineering	tự chọn	4	3	1	Phòng TN. CNTT
6	IT090IU	Phân tích và thiết kế hướng đối tượng	Object-Oriented Analysis and Design	tự chọn	4	3	1	Phòng TN. CNTT
7	IT092IU	Nguyên lý của Ngôn ngữ lập trình	Principles of Programming Languages	tự chọn	4	3	1	Phòng TN. CNTT
8	IT093IU	Phát triển ứng dụng Web	Web Application Development	tự chọn	4	3	1	Phòng TN.CNTT
9	IT094IU	Quản lý hệ thống thông tin	Information System Management	tự chọn	4	3	1	Phòng TN. CNTT
10	IT096IU	Lập trình Mạng	Net-Centric Programming	tự chọn	4	3	1	Phòng TN. CNTT
11	IT114IU	Kiến trúc phần mềm	Software Architecture	tự chọn	4	3	1	Phòng TN. CNTT
12	IT117IU	Bảo mật hệ thống và mạng	System and Network Security	tự chọn	4	3	1	Phòng TN. CNTT

13	IT122IU	Nhập môn mạng không dây	Introduction to Wireless Network	tự chọn	4	3	1	Phòng TN. CNTT
14	IT125IU	Quản trị hệ thống mạng	System and Network Administration	tự chọn	4	3	1	Phòng TN. CNTT
15	IT160IU	Khai thác dữ liệu	Data Mining	tự chọn	4	3	1	Phòng TN.CNTT
16	IT133IU	Phát triển ứng dụng di động	Mobile Application Development	tự chọn	4	3	1	Phòng TN. CNTT
17	IT138IU	Trực quan hóa dữ liệu	Data Science and Visualization	tự chọn	4	3	1	Phòng TN. CNTT
18	IT139IU	Tính toán phân tán	Scalable and Distributed Computing	tự chọn	4	3	1	Phòng TN. CNTT
19	IT140IU	Khái niệm cơ bản về bảo mật dữ liệu	Fundamental Concepts of Data Security	tự chọn	4	3	1	Phòng TN.CNTT
20	IT143IU	Công nghệ dữ liệu lớn	Big Data Technology	tự chọn	4	3	1	Phòng TN.CNTT
21	IT144IU	Phân Tích Quy Trình Nghiệp Vụ	Business Process Analysis	tự chọn	4	3	1	Phòng TN.CNTT
22	IT145IU	Hệ Thống Hỗ Trợ Quyết Định	Decision Support Systems	tự chọn	4	3	1	Phòng TN.CNTT
23	IT147IU	Điện Toán Đám Mây Di Động	Mobile Cloud Computing	tự chọn	4	3	1	Phòng TN.CNTT
24	IT150IU	Chuỗi khối	Blockchain	tự chọn	4	3	1	Phòng TN. CNTT
25	IT156IU	Phát triển và vận hành liên tục	Development & Operation (DevOps)	tự chọn	4	3	1	Phòng TN. CNTT
26	IT157IU	Học sâu	Deep Learning	tự chọn	4	3	1	Phòng TN. CNTT

27	IT158IU	Thiết kế và đánh giá giao diện	UI Design and Evaluation	tự chọn	4	3	1	Phòng TN. CNTT
28	IT131IU	Mô hình Toán cho Tin học	Theoretical Models in Computing	tự chọn	4	3	1	Phòng TN. CNTT
29	IT165IU	Công nghệ và Triển khai bảo mật	Security Technology and Implementation	tự chọn	4	3	1	Phòng TN. CNTT
30	IT166IU	Kiểm tra chất lượng phần mềm	Software Quality Verification and Validation	tự chọn	4	3	1	Phòng TN. CNTT
31	IT167IU	Phát triển ứng dụng game	Game Application Development	tự chọn	4	3	1	Phòng TN. CNTT
32	PE008IU	Tư Duy Phản Biện	Critical Thinking	tự chọn	3	3	0	Phòng TN.CNTT
33		Tự chọn tự do	Free elective	tự chọn	4	3	1	

10. Dự kiến kế hoạch giảng dạy (phân bổ các môn học theo từng học kỳ)

Tùy vào trình độ tiếng Anh của người học đạt trình độ AE1, IE2, IE1 và IE0, kế hoạch giảng dạy các môn học được cụ thể tương ứng được trình bày trong các Bảng 6, Bảng 7, Bảng 8 và Bảng 9.

10.1. Trình độ AE1 chuyên ngành Kỹ Thuật Mạng

Bảng 6. Kế hoạch giảng dạy đối với người học đạt trình độ AE1 chuyên ngành Kỹ Thuật Mạng

Học kỳ	**Mã MH**	**Tên môn học (MH)**	**Loại MH (bắt buộc /tự chọn)**	**Tín chỉ**	**Phòng TN**	**Chi chú / Môn học tiên quyết (TQ)/ Môn học học trước (HT)/**

									Môn học song hành (SH)
		Tiếng Việt	**Tiếng Anh**		**Tổng cộng**	**Lý thuyết**	**Thực hành/ Thí nghiệm**		
I (18 tín chỉ)	MA001IU	Toán 1	Calculus 1	Bắt buộc	4	4	0		Không
	EN008IU + EN007IU	Tiếng Anh chuyên ngành 1 (nghe + viết)	Academic English 1 (listening + writing skills)	Bắt buộc	4	4	0		Không
	IT064IU	Nhập môn Tin học	Introduction to Computing	Bắt buộc	3	3	0		Không
	IT116IU	Lập trình C/C++	C/C++ Programming	Bắt buộc	4	3	1	Phòng TN. CNTT	Không
	PT001IU	Giáo dục thể chất 1	Physical Training 1	Bắt buộc	3	0	3		Không
	Tổng				**18**	**14**	**4**		
II (17 tín chỉ)	IT153IU	Toán rời rạc	Discrete Mathematics	Bắt buộc	3	3	0		Môn học học trước IT116IU (3,1) C/C++ Programming hoặc IT149IU (3,1) Fundamentals of Programming
	PH013IU	Vật lý 1	Physics 1	Bắt buộc	2	2	0		Không

	EN012IU + EN011IU	Tiếng Anh chuyên ngành 2 (nói + viết)	Academic English 2 (speaking + writing skills)	Bắt buộc	4	4	0		Môn TQ EN008IU + EN007IU Academic English 1 (listening + writing skills)
	IT067IU	Thiết kế logic số	Digital Logic Design	Bắt buộc	3	3	0		Môn SH IT099IU / EE054IU Digital Logic Design Laboratory
	IT099IU	Thực hành Thiết kế logic số	Digital Logic Design Laboratory	Bắt buộc	1	0	1	Phòng TN. ĐTVT	Môn SH IT067IU Digital Logic Design
	IT069IU	Lập trình hướng đối tượng	Object-Oriented Programming	Bắt buộc	4	3	1	Phòng TN. CNTT	Môn học học trước IT116IU (3,1) C/C++ Programming hoặc IT149IU (3,1) Fundamentals of Programming
	Tổng				**17**	**15**	**2**		
III (20 tín chỉ)	IT154IU	Đại số tuyến tính	Linear algebra	Bắt buộc	3	3	0		Không
	IT013IU	Cấu trúc dữ liệu và giải thuật	Algorithms and Data Structures	Bắt buộc	4	3	1	Phòng TN. CNTT	Môn HT IT069IU Object-Oriented

									Programming
	IT079IU	Nguyên lý Quản trị Cơ sở dữ liệu	Principles of Database Management	Bắt buộc	4	3	1	Phòng TN. CNTT	Môn học học trước IT116IU (3,1) C/C++ Programming hoặc IT149IU (3,1) Fundamentals of Programming
	MA003IU	Toán 2	Calculus 2	Bắt buộc	4	4	0		Môn TQ MA001IU Calculus 1
	PE015IU	Triết học Mác-Lênin	Philosophy Marx - Lenin	Bắt buộc	3	3	0		Không
	PE016IU	Kinh tế chính trị Mác-Lênin	Marxist – Leninist Political Economy	Bắt buộc	2	2	0		Môn SH PE015IU Philosophy Marx - Lenin
	Tổng				**20**	**18**	**2**		
IV (17 tín chỉ)	IT089IU	Cấu trúc máy tính	Computer Architecture	Bắt buộc	4	3	1	Phòng TN. CNTT	Không
	IT091IU	Mạng máy tính	Computer Networks	Bắt buộc	4	3	1	Phòng TN. CNTT	Môn học HT IT116IU (3,1) C/C++ Programming hoặc IT149IU (3,1) Fundamentals of

									Programming
	IT093IU	Phát triển ứng dụng Web	Web Application Development	Bắt buộc	4	3	1	Phòng TN. CNTT	Môn học học trước IT079IU (3,1) Principles of Database Management và IT069IU (3,1) Object-Oriented Programming
	MA026IU	Xác suất, thống kê và quá trình ngẫu nhiên	Probability, Statistic & Random Process	Bắt buộc	3	3	0		Không
	PE017IU	Chủ nghĩa xã hội khoa học	Scientific Socialism	Bắt buộc	2	2	0		Môn TQ PE015IU, PE016IU Triết học Mác-Lênin, Kinh tế chính trị Mác-Lênin
	Tổng				**17**	**14**	**3**		
V (17 tín chỉ)	IT017IU	Hệ điều hành	Operating System	Bắt buộc	4	3	1	Phòng TN. CNTT	Môn HT IT089IU Computer Architecture IT013IU Algorithms

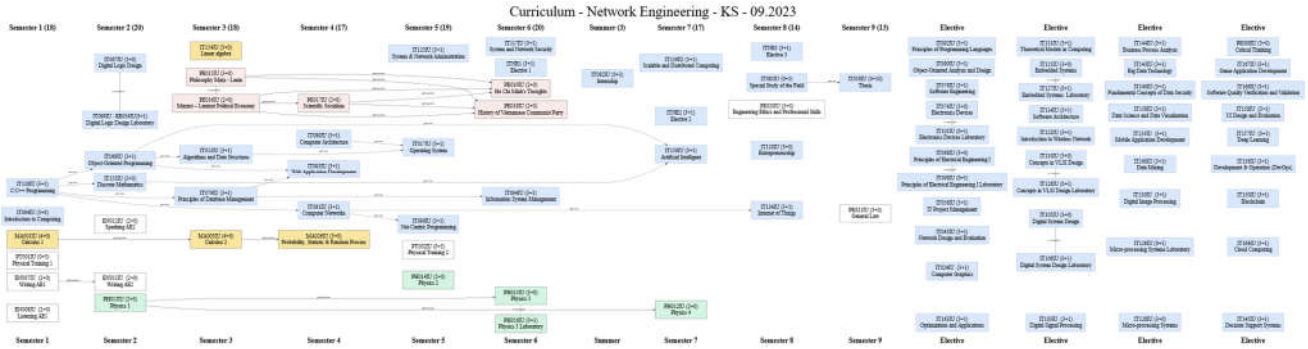
									and Data Structures
	IT096IU	Lập trình mạng	Net-Centric Programming	Bắt buộc	4	3	1	Phòng TN. CNTT	Môn HT IT091I Computer Networks
	IT125IU	Quản trị hệ thống mạng	System & Network Administration	Bắt buộc	4	3	1	Phòng TN. CNTT	Môn HT IT091I Computer Networks
	PH014IU	Vật lý 2	Physics 2	Bắt buộc	2	2	0		Không
	PT002IU	Giáo dục thể chất 2	Physical Training 2	Bắt buộc	3	0	3		Không
	Tổng				**17**	**11**	**6**		
VI (20 tín chỉ)		Môn tự chọn 1	Elective 1	Tự chọn	4	3	1	Phòng TN. CNTT	
	IT094IU	Quản lý Hệ thống thông tin	Information System Management	Bắt buộc	4	3	1	Phòng TN. CNTT	
	IT117IU	Bảo mật hệ thống và mạng	System and Network Security	Bắt buộc	4	3	1	Phòng TN. CNTT	
	PH015IU	Vật lý 3	Physics 3	Bắt buộc	3	3	0		Môn TQ Physics 1; Môn SH Physics 3 Laboratory
	PH016IU	Thực hành Vật lý 3	Physics 3 Laboratory	Bắt buộc	1	0	1	Phòng TN. Vật lý	Môn SH PH015IU Physics 3
	PE018IU	Lịch sử Đảng Cộng	History of Vietnamese Communist Party	Bắt buộc	2	2	0		Môn TQ PE017IU Scientific Socialism

		Sản Việt Nam							
	PE019IU	Tư tưởng Hồ Chí Minh	Ho Chi Minh's Thoughts	Bắt buộc	2	2	0		Môn TQ PE015IU, PE016IU, PE017IU
	Tổng				**20**	**16**	**4**		
Hè năm 3	IT082IU	Thực tập công nghiệp	Internship	Bắt buộc	3	0	3		Không
	Tổng				**3**	**0**	**3**		
VII (17 tín chỉ)		Môn tự chọn 2	Elective 2	Tự chọn	4	3	1	Phòng TN. CNTT	Không
	IT159IU	Trí thông minh nhân tạo	Artificial intelligence	Bắt buộc	4	3	1	Phòng TN. CNTT	Môn học học trước IT069IU (3,1) Object-Oriented Programming
	IT139IU	Tính toán phân tán	Scalable and Distributed Computing	Bắt buộc	4	3	1	Phòng TN. CNTT	Không
	PH012IU	Vật lý 4	Physics 4	Bắt buộc	2	2	0		Môn TQ PH013IU Physics 1
	IT120IU	Khởi nghiệp	Entrepreneurship	Bắt buộc	3	3	0		Không
	Tổng				**17**	**14**	**3**		
VIII (14 tín chỉ)	IT083IU	Thực tập tốt nghiệp	Special Study of the Field	Bắt buộc	3	0	3		Không
		Môn tự chọn 3	Elective 3	Tự chọn	4	3	1	Phòng TN. CNTT	Không

	IT134IU	Internet vạn vật	Internet of Things	Bắt Buộc	4	3	1	Phòng TN. CNTT	Môn HT IT091I Computer Networks
	PE020IU	Đạo đức và kỹ năng nghề nghiệp	Engineering Ethics and Professional Skills	Bắt buộc	3	3	0		Không
	Tổng				**14**	**9**	**5**		
IX (13 tín chỉ)	IT058IU	Luận văn tốt nghiệp	Thesis	Bắt buộc	10	0	10		Môn TQ IT083IU Special Study of the Field
	PE021IU	Pháp luật đại cương	General Law	Bắt Buộc	3	3	0		Không
	Tổng				**13**	**3**	**10**		
	TỔNG CỘNG				**156**	**114**	**42**		

Ghi chú: *Tổng số tín chỉ 156 bao gồm cả 06 tín chỉ giáo dục thể chất.*

Hình sau đây thể hiện mối quan hệ giữa các môn học trong chương trình Kỹ sư Kỹ thuật Mạng.



10.2. Trình độ AE1 chuyên ngành Kỹ Thuật Máy Tính

Bảng 7. Kế hoạch giảng dạy đối với người học đạt trình độ AE1 chuyên ngành Kỹ Thuật Máy Tính

Học kỳ	Mã MH	Tên môn học (MH)		Loại MH (bắt buộc /tự chọn)	Tín chỉ			Phòng TN	Chi chú / Môn học tiên quyết (TQ)/ Môn học học trước (HT)/ Môn học song hành (SH)
		Tiếng Việt	**Tiếng Anh**		**Tổng cộng**	**Lý thuyết**	**Thực hành/ Thí nghiệm**		
I (18 tín chỉ)	MA001IU	Toán 1	Calculus 1	Bắt buộc	4	4	0		Không
	EN008IU + EN007IU	Tiếng Anh chuyên ngành 1 (nghe + viết)	Academic English 1 (listening + writing skills)	Bắt buộc	4	4	0		Không
	IT064IU	Nhập môn Tin học	Introduction to Computing	Bắt buộc	3	3	0		Không
	IT116IU	Lập trình C/C++	C/C++ Programming	Bắt buộc	4	3	1	Phòng TN. CNTT	Không
	PT001IU	Giáo dục thể chất 1	Physical Training 1	Bắt buộc	3	0	3		Không
	Tổng				**18**	**14**	**4**		

II (17 tín chỉ)	IT153IU	Toán rời rạc	Discrete Mathematics	Bắt buộc	3	3	0		Môn học học trước IT116IU (3,1) C/C++ Programming hoặc IT149IU (3,1) Fundamentals of Programming
	PH013IU	Vật lý 1	Physics 1	Bắt buộc	2	2	0		Không
	IT067IU	Thiết kế logic số	Digital Logic Design	Bắt buộc	3	3	0		Môn SH IT099IU / EE054IU Digital Logic Design Laboratory
	IT099IU	Thực hành Thiết kế logic số	Digital Logic Design Laboratory	Bắt buộc	1	0	1	Phòng TN. ĐTVT	Môn SH IT067IU Digital Logic Design
	IT069IU	Lập trình hướng đối tượng	Object-Oriented Programming	Bắt buộc	4	3	1	Phòng TN. CNTT	Môn học HT IT116IU (3,1) C/C++ Programming hoặc IT149IU (3,1) Fundamentals of Programming
	EN012IU +	Tiếng Anh chuyên	Academic English 2	Bắt buộc	4	4	0		Môn HT EN008IU +

	EN011IU	ngành 2 (nói + viết)	(speaking + writing skills)						EN007IU Academic English 1 (listening + writing skills)
	Tổng				**17**	**15**	**2**		
III (20 tín chỉ)	IT154IU	Đại số tuyến tính	Linear algebra	Bắt buộc	3	3	0		Không
	MA003IU	Toán 2	Calculus 2	Bắt buộc	4	4	0		Môn HT MA001IU Calculus 1
	IT013IU	Cấu trúc dữ liệu và giải thuật	Algorithms and Data Structures	Bắt buộc	4	3	1	Phòng TN. CNTT	Môn HT IT069IU Object-Oriented Programming
	IT068IU	Nguyên lý mạch điện 1	Principle of Electrical Engineering I	Bắt buộc	3	3	0		Môn SH Principle of Electrical Engineering I Laboratory
	IT098IU	Thực hành nguyên lý mạch điện 1	Principle of Electrical Engineering I Laboratory	Bắt buộc	1	0	1	Phòng TN. CNTT	Môn SH Principle of Electrical Engineering I
	PE015IU	Triết học Mác-Lênin	Philosophy Marx - Lenin	Bắt buộc	3	3	0		Không
	PE016IU	Kinh tế chính trị	Marxist – Leninist	Bắt buộc	2	2	0		Môn SH PE015IU Philosophy

		Mác-Lênin	Political Economy						Marx - Lenin
	Tổng				**20**	**18**	**2**		
IV (17 tín chỉ)	IT091IU	Mạng máy tính	Computer Networks	Bắt buộc	4	3	1	Phòng TN. CNTT	Môn học học trước IT116IU (3,1) C/C++ Programming hoặc IT149IU (3,1) Fundamentals of Programming
	IT089IU	Cấu trúc máy tính	Computer Architecture	Bắt buộc	4	3	1	Phòng TN. CNTT	Không
	IT074IU	Linh kiện điện tử	Electronic Devices	Bắt buộc	3	3	0		Môn HT IT068IU Principle of Electrical Engineering I; Môn SH IT101IU Electronic Devices Laboratory
	IT101IU	Thực hành linh kiện điện tử	Electronic Devices Laboratory	Bắt buộc	1	0	1	Phòng TN. CNTT	Môn SH IT074IU Electronic Devices
	PE017IU	Chủ nghĩa xã hội khoa học	Scientific Socialism	Bắt buộc	2	2	0		Môn HT PE015IU, PE016IU Triết học Mác-Lênin,

									Kinh tế chính trị Mác-Lênin
	MA026IU	Xác suất, thống kê và quá trình ngẫu nhiên	Probability, Statistic & Random Process	Bắt buộc	3	3	0		Không
	Tổng				**17**	**14**	**3**		
V (17 tín chỉ)	PH014IU	Vật lý 2	Physics 2	Bắt buộc	2	2	0		Không
	IT017IU	Hệ điều hành	Operating System	Bắt buộc	4	3	1	Phòng TN. CNTT	Môn HT IT089IU Computer Architecture IT013IU Algorithms and Data Structures
	IT079IU	Nguyên lý Quản trị Cơ sở dữ liệu	Principles of Database Management	Bắt buộc	4	3	1	Phòng TN. CNTT	Môn học học trước IT116IU (3,1) C/C++ Programming hoặc IT149IU (3,1) Fundamentals of Programming
	IT128IU	Hệ thống vi xử lý	Micro-processing Systems	Bắt buộc	3	3	0		Môn HT IT067IU Digital Logic Design;

									Môn SH Micro-processing Systems Laboratory
	IT129IU	Thực hành hệ thống vi xử lý	Micro-processing Systems Laboratory	Bắt buộc	1	0	1	Phòng TN. CNTT	Môn SH Micro-processing Systems
	PT002IU	Giáo dục thể chất 2	Physical Training 2	Bắt buộc	3	0	3		Không
	Tổng				**17**	**11**	**6**		
VI (20 tín chỉ)		Môn tự chọn 1	Elective 1		4	3	1		Không
	IT105IU	Thiết kế hệ thống số	Digital System Design	Bắt buộc	3	3	0		Môn HT IT067IU Digital Logic Design Môn SH Digital System Design Laboratory
	IT106IU	Thực hành thiết kế hệ thống số	Digital System Design Laboratory	Bắt buộc	1	0	1	Phòng TN. CNTT	Môn SH Digital System Design
	IT115IU	Hệ thống nhúng	Embedded Systems	Bắt buộc	3	3	0	Phòng TN. CNTT	Môn HT IT128IU Micro-processing Systems;

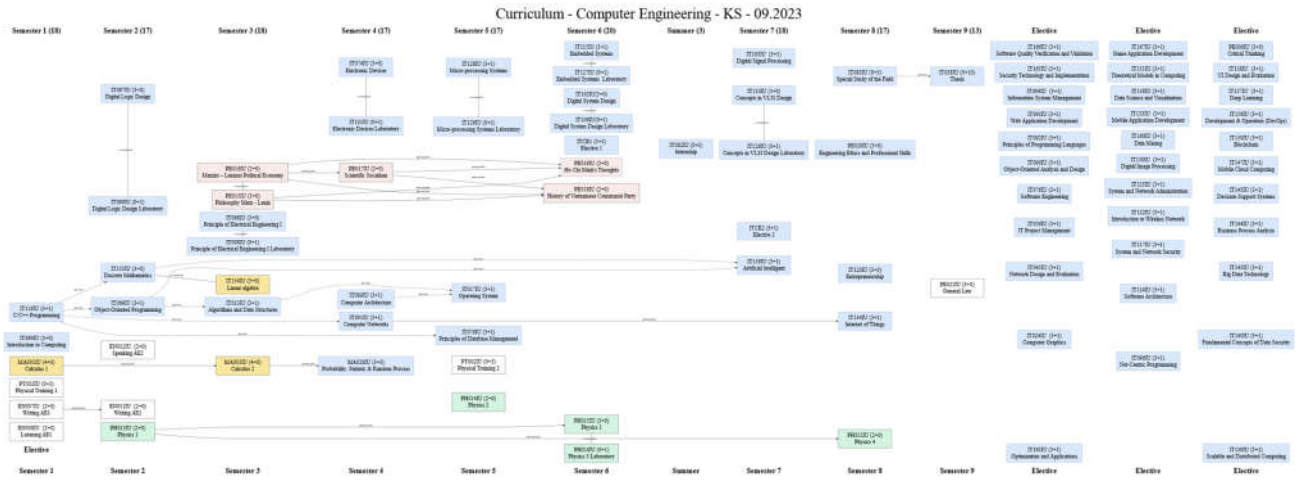
									Môn SH Embedded Systems Laboratory
	IT127IU	Thực hành hệ thống nhúng	Embedded Systems Laboratory	Bắt buộc	1	0	1		Môn SH Embedded Systems
	PH015IU	Vật lý 3	Physics 3	Bắt buộc	3	3	0		Môn HT Physics 1; Môn SH Physics 3 Laboratory
	PH016IU	Thực hành Vật lý 3	Physics 3 Laboratory	Bắt buộc	1	0	1	Phòng TN. Vật lý	Môn SH PH015IU Physics 3
	PE018IU	Lịch sử Đảng Cộng Sản Việt Nam	History of Vietnamese Communist Party	Bắt buộc	2	2	0		Môn HT PE015IU, PE016IU, PE017IU
	PE019IU	Tư tưởng Hồ Chí Minh	Ho Chi Minh's Thoughts	Bắt buộc	2	2	0		Môn HT PE015IU, PE016IU, PE017IU
	Tổng				**20**	**16**	**4**		
Hè năm 3	IT082IU	Thực tập công nghiệp	Internship	Bắt buộc	3	0	3		Không
	Tổng				**3**	**0**	**3**		
VII (16		Môn tự chọn 2	Elective 2	Tự chọn	4	3	1	Phòng TN. CNTT	Không

tín chỉ)	IT110IU	Khái niệm thiết kế VLSI	Concepts in VLSI Design	Bắt buộc	3	3	0	Phòng TN. CNTT	Môn HT IT067IU Digital Logic Design; Môn SH IT126IU Concepts in VLSI Design Laboratory
	IT126IU	Thực hành khái niệm thiết kế VLSI	Concepts in VLSI Design Laboratory	Bắt buộc	1		1	Phòng TN. CNTT	Môn SH IT110IU Concepts in VLSI Design
	IT103IU	Xử lý tín hiệu số	Digital Signal Processing	Bắt buộc	4	3	1	Phòng TN. CNTT	Không
	IT159IU	Trí thông minh nhân tạo	Artificial intelligence	Bắt buộc	4	3	1	Phòng TN. CNTT	Môn học học trước IT069IU (3,1) Object-Oriented Programming
	Tổng				**16**	**12**	**4**		
VIII (15 tín chỉ)	IT083IU	Thực tập tốt nghiệp	Special Study of the Field	Bắt buộc	3	0	3		Không
	IT134IU	Internet vạn vật	Internet of Things	Bắt Buộc	4	3	1	Phòng TN. CNTT	Môn HT IT091I Computer Networks

	IT120IU	Khởi nghiệp	Entrepreneurship	Bắt buộc	3	3	0		Không
	PH012IU	Vật lý 4	Physics 4	Bắt buộc	2	2	0		Môn HT PH013IU Physics 1
	PE020IU	Đạo đức và kỹ năng nghề nghiệp	Engineering Ethics and Professional Skills	Bắt buộc	3	3	0		Không
	Tổng				**15**	**11**	**4**		
IX (13 tín chỉ)	IT058IU	Luận văn tốt nghiệp	Thesis	Bắt buộc	10	0	10		Môn HT IT083IU Special Study of the Field
	PE021IU	Pháp luật đại cương	General Law	Bắt Buộc	3	3	0		Không
	Tổng				**13**	**3**	**10**		
	TỔNG CỘNG				**156**	**114**	**42**		

Ghi chú: *Tổng số tín chỉ 156 bao gồm cả 06 tín chỉ giáo dục thể chất.*

Hình sau đây thể hiện mối quan hệ giữa các môn học trong chương trình Kỹ sư Kỹ thuật Máy tính.



10.3. Trình độ IE2 chuyên ngành Kỹ Thuật Mạng

Bảng 8. Kế hoạch giảng dạy đối với người học đạt trình độ IE2 chuyên ngành Kỹ Thuật Mạng

Học kỳ	**Mã MH**	**Tên môn học (MH)**		**Loại MH (bắt buộc /tự chọn)**	**Tín chỉ**			**Phòng TN**	**Ghi chú / Môn học tiên quyết (TQ)/ Môn học học trước (HT)/ Môn học song hành (SH)**
		Tiếng Việt	**Tiếng Anh**		**Tổng cộng**	**Lý thuyết**	**Thực hành/ Thí nghiệm**		
I (17 tín chỉ)	ENTP02	Tiếng Anh tăng cường 2	Intensive English 2	Bắt buộc	17	17	0		
	Tổng				**17**	**17**	**0**		Không tính vào TC
II (18	MA001IU	Toán 1	Calculus 1	Bắt buộc	4	4	0		Không

tín chỉ)	EN008IU + EN007IU	Tiếng Anh chuyên ngành 1 (nghe + viết)	Academic English 1 (listening + writing skills)	Bắt buộc	4	4	0		Không
	IT064IU	Nhập môn Tin học	Introduction to Computing	Bắt buộc	3	3	0		Không
	IT116IU	Lập trình C/C++	C/C++ Programming	Bắt buộc	4	3	1	Phòng TN. CNTT	Không
	PT001IU	Giáo dục thể chất 1	Physical Training 1	Bắt buộc	3	0	3		Không
	Tổng				**18**	**14**	**4**		
III (17 tín chỉ)	IT153IU	Toán rời rạc	Discrete Mathematics	Bắt buộc	3	3	0		Môn học học trước IT116IU (3,1) C/C++ Programming hoặc IT149IU (3,1) Fundamentals of Programming
	PH013IU	Vật lý 1	Physics 1	Bắt buộc	2	2	0		Không
	EN012IU + EN011IU	Tiếng Anh chuyên ngành 2 (nói + viết)	Academic English 2 (speaking + writing skills)	Bắt buộc	4	4	0		Môn TQ EN008IU + EN007IU Academic English 1 (listening + writing skills)

	IT067IU	Thiết kế logic số	Digital Logic Design	Bắt buộc	3	3	0		Môn SH IT099IU / EE054IU Digital Logic Design Laboratory
	IT099IU	Thực hành Thiết kế logic số	Digital Logic Design Laboratory	Bắt buộc	1	0	1	Phòng TN. ĐTVT	Môn SH IT067IU Digital Logic Design
	IT069IU	Lập trình hướng đối tượng	Object-Oriented Programming	Bắt buộc	4	3	1	Phòng TN. CNTT	Môn học học trước IT116IU (3,1) C/C++ Programming hoặc IT149IU (3,1) Fundamentals of Programming
	Tổng				**17**	**15**	**2**		
IV (20 tín chỉ)	IT154IU	Đại số tuyến tính	Linear algebra	Bắt buộc	3	3	0		Không
	IT013IU	Cấu trúc dữ liệu và giải thuật	Algorithms and Data Structures	Bắt buộc	4	3	1	Phòng TN. CNTT	Môn HT IT069IU Object-Oriented Programming
	IT079IU	Nguyên lý Quản trị Cơ sở dữ liệu	Principles of Database Management	Bắt buộc	4	3	1	Phòng TN. CNTT	Môn học học trước IT116IU (3,1) C/C++ Programming hoặc IT149IU

									(3,1) Fundamentals of Programming
	MA003IU	Toán 2	Calculus 2	Bắt buộc	4	4	0		Môn TQ MA001IU Calculus 1
	PE015IU	Triết học Mác-Lênin	Philosophy Marx - Lenin	Bắt buộc	3	3	0		Không
	PE016IU	Kinh tế chính trị Mác-Lênin	Marxist – Leninist Political Economy	Bắt buộc	2	2	0		Môn SH PE015IU Philosophy Marx - Lenin
	Tổng				**20**	**18**	**2**		
V (17 tín chỉ)	IT089IU	Cấu trúc máy tính	Computer Architecture	Bắt buộc	4	3	1	Phòng TN. CNTT	Không
	IT091IU	Mạng máy tính	Computer Networks	Bắt buộc	4	3	1	Phòng TN. CNTT	Môn học HT IT116IU (3,1) C/C++ Programming hoặc IT149IU (3,1) Fundamentals of Programming
	IT093IU	Phát triển ứng dụng Web	Web Application Development	Bắt buộc	4	3	1	Phòng TN. CNTT	Môn học học trước IT079IU (3,1) Principles of Database Managemen

									t và IT069IU (3,1) Object-Oriented Programming
	MA026IU	Xác suất, thống kê và quá trình ngẫu nhiên	Probability, Statistic & Random Process	Bắt buộc	3	3	0		Không
	PE017IU	Chủ nghĩa xã hội khoa học	Scientific Socialism	Bắt buộc	2	2	0		Môn TQ PE015IU, PE016IU Triết học Mác-Lênin, Kinh tế chính trị Mác-Lênin
	Tổng				**17**	**14**	**3**		
VI (17 tín chỉ)	IT017IU	Hệ điều hành	Operating System	Bắt buộc	4	3	1	Phòng TN. CNTT	Môn HT IT089IU Computer Architecture IT013IU Algorithms and Data Structures
	IT096IU	Lập trình mạng	Net-Centric Programming	Bắt buộc	4	3	1	Phòng TN. CNTT	Môn HT IT091I Computer Networks
	IT125IU	Quản trị hệ thống mạng	System & Network Administration	Bắt buộc	4	3	1	Phòng TN. CNTT	Môn HT IT091I Computer Networks

	PH014IU	Vật lý 2	Physics 2	Bắt buộc	2	2	0		Không
	PT002IU	Giáo dục thể chất 2	Physical Training 2	Bắt buộc	3	0	3		Không
	Tổng				**17**	**11**	**6**		
Hè năm 3	IT082IU	Thực tập công nghiệp	Internship	Bắt buộc	3	0	3		Không
	Tổng				**3**	**0**	**3**		
VII (20 tín chỉ)		Môn tự chọn 1	Elective 1	Tự chọn	4	3	1	Phòng TN. CNTT	
	IT094IU	Quản lý Hệ thống thông tin	Information System Management	Bắt buộc	4	3	1	Phòng TN. CNTT	
	IT117IU	Bảo mật hệ thống và mạng	System and Network Security	Bắt buộc	4	3	1	Phòng TN. CNTT	
	PH015IU	Vật lý 3	Physics 3	Bắt buộc	3	3	0		Môn TQ Physics 1; Môn SH Physics 3 Laboratory
	PH016IU	Thực hành Vật lý 3	Physics 3 Laboratory	Bắt buộc	1	0	1	Phòng TN. Vật lý	Môn SH PH015IU Physics 3
	PE018IU	Lịch sử Đảng Cộng Sản Việt Nam	History of Vietnamese Communist Party	Bắt buộc	2	2	0		Môn TQ PE017IU Scientific Socialism
	PE019IU	Tư tưởng Hồ Chí Minh	Ho Chi Minh's Thoughts	Bắt buộc	2	2	0		Môn TQ PE015IU, PE016IU, PE017IU
	Tổng				**20**	**16**	**4**		

VIII (17 tín chỉ)		Môn tự chọn 2	Elective 2	Tự chọn	4	3	1	Phòng TN. CNTT	Không
	IT159IU	Trí thông minh nhân tạo	Artificial intelligence	Bắt buộc	4	3	1	Phòng TN. CNTT	Môn học học trước IT069IU (3,1) Object-Oriented Programming
	IT139IU	Tính toán phân tán	Scalable and Distributed Computing	Bắt buộc	4	3	1	Phòng TN. CNTT	Không
	PH012IU	Vật lý 4	Physics 4	Bắt buộc	2	2	0		Môn TQ PH013IU Physics 1
	IT120IU	Khởi nghiệp	Entrepreneurship	Bắt buộc	3	3	0		Không
	Tổng				**17**	**14**	**3**		
IX (14 tín chỉ)	IT083IU	Thực tập tốt nghiệp	Special Study of the Field	Bắt buộc	3	0	3		Không
		Môn tự chọn 3	Elective 3	Tự chọn	4	3	1	Phòng TN. CNTT	Không
	IT134IU	Internet vạn vật	Internet of Things	Bắt Buộc	4	3	1	Phòng TN. CNTT	Môn HT IT091I Computer Networks
	PE020IU	Đạo đức và kỹ năng nghề nghiệp	Engineering Ethics and Professional Skills	Bắt buộc	3	3	0		Không
	Tổng				**14**	**9**	**5**		

X (13 tín chỉ)	IT058IU	Luận văn tốt nghiệp	Thesis	Bắt buộc	10	0	10		Môn TQ IT083IU Special Study of the Field
	PE021IU	Pháp luật đại cương	General Law	Bắt Buộc	3	3	0		Không
	Tổng				**13**	**3**	**10**		
	TỔNG CỘNG				**156**	**114**	**42**		

10.4. Trình độ IE2 chuyên ngành Kỹ Thuật Máy Tính

Bảng 9. Kế hoạch giảng dạy đối với người học đạt trình độ IE2 chuyên ngành Kỹ Thuật Máy Tính

Học kỳ	**Mã MH**	**Tên môn học (MH)**		**Loại MH (bắt buộc /tự chọn)**	**Tín chỉ**			**Phòng TN**	**Chi chú / Môn học tiên quyết (TQ)/ Môn học học trước (HT)/ Môn học song hành (SH)**
		Tiếng Việt	**Tiếng Anh**		**Tổng cộng**	**Lý thuyết**	**Thực hành/ Thí nghiệm**		
I (17 tín chỉ)	ENTP02	Tiếng Anh tăng cường 2	Intensive English 2	Bắt buộc	17	17	0		

	Tổng				**17**	**17**	**0**		Không tính vào TC
II (18 tín chỉ)	MA001IU	Toán 1	Calculus 1	Bắt buộc	4	4	0		Không
	EN008IU + EN007IU	Tiếng Anh chuyên ngành 1 (nghe + viết)	Academic English 1 (listening + writing skills)	Bắt buộc	4	4	0		Không
	IT064IU	Nhập môn Tin học	Introduction to Computing	Bắt buộc	3	3	0		Không
	IT116IU	Lập trình C/C++	C/C++ Programming	Bắt buộc	4	3	1	Phòng TN. CNTT	Không
	PT001IU	Giáo dục thể chất 1	Physical Training 1	Bắt buộc	3	0	3		Không
	Tổng				**18**	**14**	**4**		
III (17 tín chỉ)	IT153IU	Toán rời rạc	Discrete Mathematics	Bắt buộc	3	3	0		Môn học học trước IT116IU (3,1) C/C++ Programming hoặc IT149IU (3,1) Fundamentals of Programming
	PH013IU	Vật lý 1	Physics 1	Bắt buộc	2	2	0		Không
	IT067IU	Thiết kế logic số	Digital Logic Design	Bắt buộc	3	3	0		Môn SH IT099IU / EE054IU Digital

									Logic Design Laboratory
	IT099IU	Thực hành Thiết kế logic số	Digital Logic Design Laboratory	Bắt buộc	1	0	1	Phòng TN. ĐTVT	Môn SH IT067IU Digital Logic Design
	IT069IU	Lập trình hướng đối tượng	Object-Oriented Programming	Bắt buộc	4	3	1	Phòng TN. CNTT	Môn học HT IT116IU (3,1) C/C++ Programming hoặc IT149IU (3,1) Fundamentals of Programming
	EN012IU + EN011IU	Tiếng Anh chuyên ngành 2 (nói + viết)	Academic English 2 (speaking + writing skills)	Bắt buộc	4	4	0		Môn HT EN008IU + EN007IU Academic English 1 (listening + writing skills)
	Tổng				**17**	**15**	**2**		
IV (20 tín chỉ)	IT154IU	Đại số tuyến tính	Linear algebra	Bắt buộc	3	3	0		Không
	MA003IU	Toán 2	Calculus 2	Bắt buộc	4	4	0		Môn HT MA001 IU Calculus 1
	IT013IU	Cấu trúc dữ liệu và giải thuật	Algorithms and Data Structures	Bắt buộc	4	3	1	Phòng TN. CNTT	Môn HT IT069IU Object-Oriented

									Programming
	IT068IU	Nguyên lý mạch điện 1	Principle of Electrical Engineering I	Bắt buộc	3	3	0		Môn SH Principle of Electrical Engineering I Laboratory
	IT098IU	Thực hành nguyên lý mạch điện 1	Principle of Electrical Engineering I Laboratory	Bắt buộc	1	0	1	Phòng TN. CNTT	Môn SH Principle of Electrical Engineering I
	PE015IU	Triết học Mác-Lênin	Philosophy Marx - Lenin	Bắt buộc	3	3	0		Không
	PE016IU	Kinh tế chính trị Mác-Lênin	Marxist – Leninist Political Economy	Bắt buộc	2	2	0		Môn SH PE015IU Philosophy Marx - Lenin
	Tổng				**20**	**18**	**2**		
V (17 tín chỉ)	IT091IU	Mạng máy tính	Computer Networks	Bắt buộc	4	3	1	Phòng TN. CNTT	Môn học học trước IT116IU (3,1) C/C++ Programming hoặc IT149IU (3,1) Fundamentals of Programming
	IT089IU	Cấu trúc máy tính	Computer Architecture	Bắt buộc	4	3	1	Phòng TN. CNTT	Không

	IT074IU	Linh kiện điện tử	Electronic Devices	Bắt buộc	3	3	0		Môn HT IT068IU Principle of Electrical Engineering I; Môn SH IT101IU Electronic Devices Laboratory
	IT101IU	Thực hành linh kiện điện tử	Electronic Devices Laboratory	Bắt buộc	1	0	1	Phòng TN. CNTT	Môn SH IT074IU Electronic Devices
	PE017IU	Chủ nghĩa xã hội khoa học	Scientific Socialism	Bắt buộc	2	2	0		Môn HT PE015IU, PE016IU Triết học Mác-Lênin, Kinh tế chính trị Mác-Lênin
	MA026IU	Xác suất, thống kê và quá trình ngẫu nhiên	Probability, Statistic & Random Process	Bắt buộc	3	3	0		Không
	Tổng				**17**	**14**	**3**		
VI (17 tín chỉ)	PH014IU	Vật lý 2	Physics 2	Bắt buộc	2	2	0		Không
	IT017IU	Hệ điều hành	Operating System	Bắt buộc	4	3	1	Phòng TN. CNTT	Môn HT IT089IU Computer Architecture

									IT013IU Algorithms and Data Structures
	IT079IU	Nguyên lý Quản trị Cơ sở dữ liệu	Principles of Database Management	Bắt buộc	4	3	1	Phòng TN. CNTT	Môn học học trước IT116IU (3,1) C/C++ Programming hoặc IT149IU (3,1) Fundamentals of Programming
	IT128IU	Hệ thống vi xử lý	Micro-processing Systems	Bắt buộc	3	3	0		Môn HT IT067IU Digital Logic Design; Môn SH Micro-processing Systems Laboratory
	IT129IU	Thực hành hệ thống vi xử lý	Micro-processing Systems Laboratory	Bắt buộc	1	0	1	Phòng TN. CNTT	Môn SH Micro-processing Systems
	PT002IU	Giáo dục thể chất 2	Physical Training 2	Bắt buộc	3	0	3		Không
	Tổng				**17**	**11**	**6**		
Hè	IT082IU	Thực tập công nghiệp	Internship	Bắt buộc	3	0	3		Không
	Tổng				**3**	**0**	**3**		

VII (20 tín chỉ)		Môn tự chọn 1	Elective 1		4	3	1		Không
	IT105IU	Thiết kế hệ thống số	Digital System Design	Bắt buộc	3	3	0		Môn HT IT067IU Digital Logic Design Môn SH Digital System Design Laboratory
	IT106IU	Thực hành thiết kế hệ thống số	Digital System Design Laboratory	Bắt buộc	1	0	1	Phòng TN. CNTT	Môn SH Digital System Design
	IT115IU	Hệ thống nhúng	Embedded Systems	Bắt buộc	3	3	0	Phòng TN. CNTT	Môn HT IT128IU Micro-processing Systems; Môn SH Embedded Systems Laboratory
	IT127IU	Thực hành hệ thống nhúng	Embedded Systems Laboratory	Bắt buộc	1	0	1		Môn SH Embedded Systems
	PH015IU	Vật lý 3	Physics 3	Bắt buộc	3	3	0		Môn HT Physics 1; Môn SH Physics 3 Laboratory

	PH016IU	Thực hành Vật lý 3	Physics 3 Laboratory	Bắt buộc	1	0	1	Phòng TN. Vật lý	Môn SH PH015IU Physics 3
	PE018IU	Lịch sử Đảng Cộng Sản Việt Nam	History of Vietnamese Communist Party	Bắt buộc	2	2	0		Môn HT PE015IU, PE016IU, PE017IU
	PE019IU	Tư tưởng Hồ Chí Minh	Ho Chi Minh's Thoughts	Bắt buộc	2	2	0		Môn HT PE015IU, PE016IU, PE017IU
	Tổng				**20**	**16**	**4**		
VIII (16 tín chỉ)		Môn tự chọn 2	Elective 2	Tự chọn	4	3	1	Phòng TN. CNTT	Không
	IT110IU	Khái niệm thiết kế VLSI	Concepts in VLSI Design	Bắt buộc	3	3	0	Phòng TN. CNTT	Môn HT IT067IU Digital Logic Design; Môn SH IT126IU Concepts in VLSI Design Laboratory
	IT126IU	Thực hành khái niệm thiết kế VLSI	Concepts in VLSI Design Laboratory	Bắt buộc	1		1	Phòng TN. CNTT	Môn SH IT110IU Concepts in VLSI Design
	IT103IU	Xử lý tín hiệu số	Digital Signal Processing	Bắt buộc	4	3	1	Phòng TN. CNTT	Không

	IT159IU	Trí thông minh nhân tạo	Artificial intelligence	Bắt buộc	4	3	1	Phòng TN. CNTT	Môn học học trước IT069IU (3,1) Object-Oriented Programming
	Tổng				**16**	**12**	**4**		
IX (15 tín chỉ)	IT083IU	Thực tập tốt nghiệp	Special Study of the Field	Bắt buộc	3	0	3		Không
	IT134IU	Internet vạn vật	Internet of Things	Bắt Buộc	4	3	1	Phòng TN. CNTT	Môn HT IT091I Computer Networks
	IT120IU	Khởi nghiệp	Entrepreneurship	Bắt buộc	3	3	0		Không
	PH012IU	Vật lý 4	Physics 4	Bắt buộc	2	2	0		Môn HT PH013IU Physics 1
	PE020IU	Đạo đức và kỹ năng nghề nghiệp	Engineering Ethics and Professional Skills	Bắt buộc	3	3	0		Không
	Tổng				**15**	**11**	**4**		
X (13 tín chỉ)	IT058IU	Luận văn tốt nghiệp	Thesis	Bắt buộc	10	0	10		Môn HT IT083IU Special Study of the Field
	PE021IU	Pháp luật đại cương	General Law	Bắt Buộc	3	3	0		Không
	Tổng				**13**	**3**	**10**		
	TỔNG CỘNG				**156**	**114**	**42**		

10.5. Trình độ IE1 chuyên ngành Kỹ Thuật Mạng

Bảng 10. Kế hoạch giảng dạy đối với người học đạt trình độ IE1 chuyên ngành Kỹ Thuật Mạng

Học kỳ	**Mã MH**	**Tên môn học (MH)**		**Loại MH (bắt buộc /tự chọn)**	**Tín chỉ**			**Phòng TN**	**Ghi chú / Môn học tiên quyết (TQ)/ Môn học học trước (HT)/ Môn học song hành (SH)**
		Tiếng Việt	**Tiếng Anh**		**Tổng cộng**	**Lý thuyết**	**Thực hành/ Thí nghiệm**		
I (34 tín chỉ)	ENTP01	Tiếng Anh tăng cường 1	Intensive English 2	Bắt buộc	17	17	0		
	ENTP02	Tiếng Anh tăng cường 2	Intensive English 2	Bắt buộc	17	17	0		
	Tổng				**34**	**34**	**0**		Không tính vào TC
II (18 tín chỉ)	MA001IU	Toán 1	Calculus 1	Bắt buộc	4	4	0		Không
	EN008IU + EN007IU	Tiếng Anh chuyên ngành 1 (nghe + viết)	Academic English 1 (listening + writing skills)	Bắt buộc	4	4	0		Không

	IT064IU	Nhập môn Tin học	Introduction to Computing	Bắt buộc	3	3	0		Không
	IT116IU	Lập trình C/C++	C/C++ Programming	Bắt buộc	4	3	1	Phòng TN. CNTT	Không
	PT001IU	Giáo dục thể chất 1	Physical Training 1	Bắt buộc	3	0	3		Không
	Tổng				**18**	**14**	**4**		
III (17 tín chỉ)	IT153IU	Toán rời rạc	Discrete Mathematics	Bắt buộc	3	3	0		Môn học học trước IT116IU (3,1) C/C++ Programming hoặc IT149IU (3,1) Fundamentals of Programming
	PH013IU	Vật lý 1	Physics 1	Bắt buộc	2	2	0		Không
	EN012IU + EN011IU	Tiếng Anh chuyên ngành 2 (nói + viết)	Academic English 2 (speaking + writing skills)	Bắt buộc	4	4	0		Môn TQ EN008IU + EN007IU Academic English 1 (listening + writing skills)
	IT067IU	Thiết kế logic số	Digital Logic Design	Bắt buộc	3	3	0		Môn SH IT099IU / EE054IU Digital Logic Design Laboratory

	IT099IU / EE054IU	Thực hành Thiết kế logic số	Digital Logic Design Laboratory	Bắt buộc	1	0	1	Phòng TN. ĐTVT	Môn SH IT067IU Digital Logic Design
	IT069IU	Lập trình hướng đối tượng	Object-Oriented Programming	Bắt buộc	4	3	1	Phòng TN. CNTT	Môn học học trước IT116IU (3,1) C/C++ Programming hoặc IT149IU (3,1) Fundamentals of Programming
	Tổng				**17**	**15**	**2**		
IV (20 tín chỉ)	IT154IU	Đại số tuyến tính	Linear algebra	Bắt buộc	3	3	0		Không
	IT013IU	Cấu trúc dữ liệu và giải thuật	Algorithms and Data Structures	Bắt buộc	4	3	1	Phòng TN. CNTT	Môn HT IT069IU Object-Oriented Programming
	IT079IU	Nguyên lý Quản trị Cơ sở dữ liệu	Principles of Database Management	Bắt buộc	4	3	1	Phòng TN. CNTT	Môn học học trước IT116IU (3,1) C/C++ Programming hoặc IT149IU (3,1) Fundamentals of Programming

	MA003IU	Toán 2	Calculus 2	Bắt buộc	4	4	0		Môn TQ MA001IU Calculus 1
	PE015IU	Triết học Mác-Lênin	Philosophy Marx - Lenin	Bắt buộc	3	3	0		Không
	PE016IU	Kinh tế chính trị Mác-Lênin	Marxist – Leninist Political Economy	Bắt buộc	2	2	0		Môn SH PE015IU Philosophy Marx - Lenin
	Tổng				**20**	**18**	**2**		
V (17 tín chỉ)	IT089IU	Cấu trúc máy tính	Computer Architecture	Bắt buộc	4	3	1	Phòng TN. CNTT	Không
	IT091IU	Mạng máy tính	Computer Networks	Bắt buộc	4	3	1	Phòng TN. CNTT	Môn học HT IT116IU (3,1) C/C++ Programming hoặc IT149IU (3,1) Fundamentals of Programming
	IT093IU	Phát triển ứng dụng Web	Web Application Development	Bắt buộc	4	3	1	Phòng TN. CNTT	Môn học học trước IT079IU (3,1) Principles of Database Management và IT069IU (3,1) Object-Oriented Programming

	MA026IU	Xác suất, thống kê và quá trình ngẫu nhiên	Probability, Statistic & Random Process	Bắt buộc	3	3	0		Không
	PE017IU	Chủ nghĩa xã hội khoa học	Scientific Socialism	Bắt buộc	2	2	0		Môn TQ PE015IU, PE016IU Triết học Mác-Lênin, Kinh tế chính trị Mác-Lênin
	Tổng				**17**	**14**	**3**		
VI (17 tín chỉ)	IT017IU	Hệ điều hành	Operating System	Bắt buộc	4	3	1	Phòng TN. CNTT	Môn HT IT089IU Computer Architecture IT013IU Algorithms and Data Structures
	IT096IU	Lập trình mạng	Net-Centric Programming	Bắt buộc	4	3	1	Phòng TN. CNTT	Môn HT IT091I Computer Networks
	IT125IU	Quản trị hệ thống mạng	System & Network Administration	Bắt buộc	4	3	1	Phòng TN. CNTT	Môn HT IT091I Computer Networks
	PH014IU	Vật lý 2	Physics 2	Bắt buộc	2	2	0		Không
	PT002IU	Giáo dục thể chất 2	Physical Training 2	Bắt buộc	3	0	3		Không
	Tổng				**17**	**11**	**6**		

Hè năm 3	IT082IU	Thực tập công nghiệp	Internship	Bắt buộc	3	0	3		Không
	Tổng				**3**	**0**	**3**		
VII (20 tín chỉ)		Môn tự chọn 1	Elective 1	Tự chọn	4	3	1	Phòng TN. CNTT	
	IT094IU	Quản lý Hệ thống thông tin	Information System Management	Bắt buộc	4	3	1	Phòng TN. CNTT	
	IT117IU	Bảo mật hệ thống và mạng	System and Network Security	Bắt buộc	4	3	1	Phòng TN. CNTT	
	PH015IU	Vật lý 3	Physics 3	Bắt buộc	3	3	0		Môn TQ Physics 1; Môn SH Physics 3 Laboratory
	PH016IU	Thực hành Vật lý 3	Physics 3 Laboratory	Bắt buộc	1	0	1	Phòng TN. Vật lý	Môn SH PH015IU Physics 3
	PE018IU	Lịch sử Đảng Cộng Sản Việt Nam	History of Vietnamese Communist Party	Bắt buộc	2	2	0		Môn TQ PE017IU Scientific Socialism
	PE019IU	Tư tưởng Hồ Chí Minh	Ho Chi Minh's Thoughts	Bắt buộc	2	2	0		Môn TQ PE015IU, PE016IU, PE017IU
	Tổng				**20**	**16**	**4**		
VIII (17 tín chỉ)		Môn tự chọn 2	Elective 2	Tự chọn	4	3	1	Phòng TN. CNTT	Không
	IT159IU	Trí thông	Artificial intelligence	Bắt buộc	4	3	1	Phòng TN. CNTT	Môn học học trước IT069IU

		minh nhân tạo							(3,1) Object-Oriented Programming
	IT139IU	Tính toán phân tán	Scalable and Distributed Computing	Bắt buộc	4	3	1	Phòng TN. CNTT	Không
	PH012IU	Vật lý 4	Physics 4	Bắt buộc	2	2	0		Môn TQ PH013IU Physics 1
	IT120IU	Khởi nghiệp	Entrepreneurship	Bắt buộc	3	3	0		Không
	Tổng				**17**	**14**	**3**		
IX (14 tín chỉ)	IT083IU	Thực tập tốt nghiệp	Special Study of the Field	Bắt buộc	3	0	3		Không
		Môn tự chọn 3	Elective 3	Tự chọn	4	3	1	Phòng TN. CNTT	Không
	IT134IU	Internet vạn vật	Internet of Things	Bắt Buộc	4	3	1	Phòng TN. CNTT	Môn HT IT091I Computer Networks
	PE020IU	Đạo đức và kỹ năng nghề nghiệp	Engineering Ethics and Professional Skills	Bắt buộc	3	3	0		Không
	Tổng				**14**	**9**	**5**		
X (13 tín chỉ)	IT058IU	Luận văn tốt nghiệp	Thesis	Bắt buộc	10	0	10		Môn TQ IT083IU Special Study of the Field
	PE021IU	Pháp luật đại cương	General Law	Bắt Buộc	3	3	0		Không

	Tổng		**13**	**3**	**10**		
	TỔNG CỘNG		**156**	**114**	**42**		

10.6. Trình độ IE1 chuyên ngành Kỹ Thuật Máy Tính

Bảng 11. Kế hoạch giảng dạy đối với người học đạt trình độ IE1 chuyên ngành Kỹ Thuật Máy Tính

Học kỳ	**Mã MH**	**Tên môn học (MH)**		**Loại MH (bắt buộc /tự chọn)**	**Tín chỉ**			**Phòng TN**	**Chi chú / Môn học tiên quyết (TQ)/ Môn học học trước (HT)/ Môn học song hành (SH)**
		Tiếng Việt	**Tiếng Anh**		**Tổng cộng**	**Lý thu yết**	**Thực hành/ Thí nghiệm**		
I (34 tín chỉ)	ENTP01	Tiếng Anh tăng cường 1	Intensive English 1	Bắt buộc	17	17	0		
	ENTP02	Tiếng Anh tăng cường 2	Intensive English 2	Bắt buộc	17	17	0		
	Tổng				**34**	**34**	**0**		Không tính vào TC
II (18	MA001IU	Toán 1	Calculus 1	Bắt buộc	4	4	0		Không

tín chỉ)	EN008IU + EN007IU	Tiếng Anh chuyên ngành 1 (nghe + viết)	Academic English 1 (listening + writing skills)	Bắt buộc	4	4	0		Không
	IT064IU	Nhập môn Tin học	Introduction to Computing	Bắt buộc	3	3	0		Không
	IT116IU	Lập trình C/C++	C/C++ Programming	Bắt buộc	4	3	1	Phòng TN. CNTT	Không
	PT001IU	Giáo dục thể chất 1	Physical Training 1	Bắt buộc	3	0	3		Không
	Tổng				**18**	**14**	**4**		
III (17 tín chỉ)	IT153IU	Toán rời rạc	Discrete Mathematics	Bắt buộc	3	3	0		Môn học học trước IT116IU (3,1) C/C++ Programming hoặc IT149IU (3,1) Fundamentals of Programming
	PH013IU	Vật lý 1	Physics 1	Bắt buộc	2	2	0		Không
	IT067IU	Thiết kế logic số	Digital Logic Design	Bắt buộc	3	3	0		Môn SH IT099IU / EE054IU Digital Logic Design Laboratory

	IT099IU	Thực hành Thiết kế logic số	Digital Logic Design Laboratory	Bắt buộc	1	0	1	Phòng TN. ĐTVT	Môn SH IT067IU Digital Logic Design
	IT069IU	Lập trình hướng đối tượng	Object-Oriented Programming	Bắt buộc	4	3	1	Phòng TN. CNTT	Môn học HT IT116IU (3,1) C/C++ Programming hoặc IT149IU (3,1) Fundamentals of Programming
	EN012IU + EN011IU	Tiếng Anh chuyên ngành 2 (nói + viết)	Academic English 2 (speaking + writing skills)	Bắt buộc	4	4	0		Môn HT EN008IU + EN007IU Academic English 1 (listening + writing skills)
	Tổng				**17**	**15**	**2**		
IV (20 tín chỉ)	IT154IU	Đại số tuyến tính	Linear algebra	Bắt buộc	3	3	0		Không
	MA003IU	Toán 2	Calculus 2	Bắt buộc	4	4	0		Môn HT MA001IU Calculus 1
	IT013IU	Cấu trúc dữ liệu và giải thuật	Algorithms and Data Structures	Bắt buộc	4	3	1	Phòng TN. CNTT	Môn HT IT069IU Object-Oriented Programming

	IT068IU	Nguyên lý mạch điện 1	Principle of Electrical Engineering I	Bắt buộc	3	3	0		Môn SH Principle of Electrical Engineering I Laboratory
	IT098IU	Thực hành nguyên lý mạch điện 1	Principle of Electrical Engineering I Laboratory	Bắt buộc	1	0	1	Phòng TN. CNTT	Môn SH Principle of Electrical Engineering I
	PE015IU	Triết học Mác-Lênin	Philosophy Marx - Lenin	Bắt buộc	3	3	0		Không
	PE016IU	Kinh tế chính trị Mác-Lênin	Marxist – Leninist Political Economy	Bắt buộc	2	2	0		Môn SH PE015IU Philosophy Marx - Lenin
	Tổng				**20**	**18**	**2**		
V (17 tín chỉ)	IT091IU	Mạng máy tính	Computer Networks	Bắt buộc	4	3	1	Phòng TN. CNTT	Môn học học trước IT116IU (3,1) C/C++ Programming hoặc IT149IU (3,1) Fundamentals of Programming
	IT089IU	Cấu trúc máy tính	Computer Architecture	Bắt buộc	4	3	1	Phòng TN. CNTT	Không
	IT074IU	Linh kiện điện tử	Electronic Devices	Bắt buộc	3	3	0		Môn HT IT068IU Principle of

									Electrical Engineering I; Môn SH IT101IU Electronic Devices Laboratory
	IT101IU	Thực hành linh kiện điện tử	Electronic Devices Laboratory	Bắt buộc	1	0	1	Phòng TN. CNTT	Môn SH IT074IU Electronic Devices
	PE017IU	Chủ nghĩa xã hội khoa học	Scientific Socialism	Bắt buộc	2	2	0		Môn HT PE015IU, PE016IU Triết học Mác-Lênin, Kinh tế chính trị Mác-Lênin
	MA026IU	Xác suất, thống kê và quá trình ngẫu nhiên	Probability, Statistic & Random Process	Bắt buộc	3	3	0		Không
	Tổng				**17**	**14**	**3**		
VI (17 tín chỉ)	PH014IU	Vật lý 2	Physics 2	Bắt buộc	2	2	0		Không
	IT017IU	Hệ điều hành	Operating System	Bắt buộc	4	3	1	Phòng TN. CNTT	Môn HT IT089IU Computer Architecture IT013IU Algorithms and Data Structures

	IT079IU	Nguyên lý Quản trị Cơ sở dữ liệu	Principles of Database Management	Bắt buộc	4	3	1	Phòng TN. CNTT	Môn học học trước IT116IU (3,1) C/C++ Programming hoặc IT149IU (3,1) Fundamentals of Programming
	IT128IU	Hệ thống vi xử lý	Micro-processing Systems	Bắt buộc	3	3	0		Môn HT IT067IU Digital Logic Design; Môn SH Micro-processing Systems Laboratory
	IT129IU	Thực hành hệ thống vi xử lý	Micro-processing Systems Laboratory	Bắt buộc	1	0	1	Phòng TN. CNTT	Môn SH Micro-processing Systems
	PT002IU	Giáo dục thể chất 2	Physical Training 2	Bắt buộc	3	0	3		Không
	Tổng				**17**	**11**	**6**		
Hè	IT082IU	Thực tập công nghiệp	Internship	Bắt buộc	3	0	3		Không
	Tổng				**3**	**0**	**3**		
VII (20		Môn tự chọn 1	Elective 1		4	3	1		Không

tín chỉ)	IT105IU	Thiết kế hệ thống số	Digital System Design	Bắt buộc	3	3	0		Môn HT IT067IU Digital Logic Design Môn SH Digital System Design Laboratory
	IT106IU	Thực hành thiết kế hệ thống số	Digital System Design Laboratory	Bắt buộc	1	0	1	Phòng TN. CNTT	Môn SH Digital System Design
	IT115IU	Hệ thống nhúng	Embedded Systems	Bắt buộc	3	3	0	Phòng TN. CNTT	Môn HT IT128IU Micro-processing Systems; Môn SH Embedded Systems Laboratory
	IT127IU	Thực hành hệ thống nhúng	Embedded Systems Laboratory	Bắt buộc	1	0	1		Môn SH Embedded Systems
	PH015IU	Vật lý 3	Physics 3	Bắt buộc	3	3	0		Môn HT Physics 1; Môn SH Physics 3 Laboratory
	PH016IU	Thực hành Vật lý 3	Physics 3 Laboratory	Bắt buộc	1	0	1	Phòng TN. Vật lý	Môn SH PH015IU Physics 3

	PE018IU	Lịch sử Đảng Cộng Sản Việt Nam	History of Vietnamese Communist Party	Bắt buộc	2	2	0		Môn HT PE015IU, PE016IU, PE017IU
	PE019IU	Tư tưởng Hồ Chí Minh	Ho Chi Minh's Thoughts	Bắt buộc	2	2	0		Môn HT PE015IU, PE016IU, PE017IU
	Tổng				**20**	**16**	**4**		
VIII (16 tín chỉ)		Môn tự chọn 2	Elective 2	Tự chọn	4	3	1	Phòng TN. CNTT	Không
	IT110IU	Khái niệm thiết kế VLSI	Concepts in VLSI Design	Bắt buộc	3	3	0	Phòng TN. CNTT	Môn HT IT067IU Digital Logic Design; Môn SH IT126IU Concepts in VLSI Design Laboratory
	IT126IU	Thực hành khái niệm thiết kế VLSI	Concepts in VLSI Design Laboratory	Bắt buộc	1		1	Phòng TN. CNTT	Môn SH IT110IU Concepts in VLSI Design
	IT103IU	Xử lý tín hiệu số	Digital Signal Processing	Bắt buộc	4	3	1	Phòng TN. CNTT	Không
	IT159IU	Trí thông minh nhân tạo	Artificial intelligence	Bắt buộc	4	3	1	Phòng TN. CNTT	Môn học học trước IT069IU (3,1)

									Object-Oriented Programming
	Tổng				**16**	**12**	**4**		
IX (15 tín chỉ)	IT083IU	Thực tập tốt nghiệp	Special Study of the Field	Bắt buộc	3	0	3		Không
	IT134IU	Internet vạn vật	Internet of Things	Bắt Buộc	4	3	1	Phòng TN. CNTT	Môn HT IT091I Computer Networks
	IT120IU	Khởi nghiệp	Entrepreneurship	Bắt buộc	3	3	0		Không
	PH012IU	Vật lý 4	Physics 4	Bắt buộc	2	2	0		Môn HT PH013IU Physics 1
	PE020IU	Đạo đức và kỹ năng nghề nghiệp	Engineering Ethics and Professional Skills	Bắt buộc	3	3	0		Không
	Tổng				**15**	**11**	**4**		
X (13 tín chỉ)	IT058IU	Luận văn tốt nghiệp	Thesis	Bắt buộc	10	0	10		Môn HT IT083IU Special Study of the Field
	PE021IU	Pháp luật đại cương	General Law	Bắt Buộc	3	3	0		Không
	Tổng				**13**	**3**	**10**		
	TỔNG CỘNG				**156**	**114**	**42**		

10.7. Trình độ IE0 chuyên ngành Kỹ Thuật Mạng

Bảng 12. Kế hoạch giảng dạy đối với người học đạt trình độ IE0 chuyên ngành Kỹ Thuật Mạng

Học kỳ	**Mã MH**	**Tên môn học (MH)**		**Loại MH (bắt buộc /tự chọn)**	**Tín chỉ**			**Phòng TN**	**Môn học tiên quyết (TQ)/ Môn học học trước (HT)/ Môn học song hành (SH)**
		Tiếng Việt	**Tiếng Anh**		**Tổng cộng**	**Lý thuyết**	**Thực hành / Thí nghiệm**		
I (34 tín chỉ)	ENTP00	Tiếng Anh tăng cường 0	Intensive English 0	Bắt buộc	17	17	0		
	ENTP01	Tiếng Anh tăng cường 1	Intensive English 1	Bắt buộc	17	17	0		
	Tổng				**34**	**34**	**0**		Không tính vào TC
II (17 tín chỉ)	ENTP02	Tiếng Anh tăng cường 2	Intensive English 2	Bắt buộc	17	17	0		
	Tổng				**17**	**17**	**0**		Không tính vào TC
III (18 tín chỉ)	MA001IU	Toán 1	Calculus 1	Bắt buộc	4	4	0		Không
	EN008IU +	Tiếng Anh	Academic English 1	Bắt buộc	4	4	0		Không

	EN007IU	chuyên ngành 1 (nghe + viết)	(listening + writing skills)						
	IT064IU	Nhập môn Tin học	Introduction to Computing	Bắt buộc	3	3	0		Không
	IT116IU	Lập trình C/C++	C/C++ Programming	Bắt buộc	4	3	1	Phòng TN. CNTT	Không
	PT001IU	Giáo dục thể chất 1	Physical Training 1	Bắt buộc	3	0	3		Không
	Tổng				**18**	**14**	**4**		
IV (17 tín chỉ)	IT153IU	Toán rời rạc	Discrete Mathematics	Bắt buộc	3	3	0		Môn học học trước IT116IU (3,1) C/C++ Programming hoặc IT149IU (3,1) Fundamentals of Programming
	PH013IU	Vật lý 1	Physics 1	Bắt buộc	2	2	0		Không
	EN012IU + EN011IU	Tiếng Anh chuyên ngành 2 (nói + viết)	Academic English 2 (speaking + writing skills)	Bắt buộc	4	4	0		Môn TQ EN008IU + EN007IU Academic

									English 1 (listening + writing skills)
	IT067IU	Thiết kế logic số	Digital Logic Design	Bắt buộc	3	3	0		Môn SH IT099IU / EE054IU Digital Logic Design Laboratory
	IT099IU	Thực hành Thiết kế logic số	Digital Logic Design Laboratory	Bắt buộc	1	0	1	Phòng TN. ĐTVT	Môn SH IT067IU Digital Logic Design
	IT069IU	Lập trình hướng đối tượng	Object-Oriented Programming	Bắt buộc	4	3	1	Phòng TN. CNTT	Môn học học trước IT116IU (3,1) C/C++ Programming hoặc IT149IU (3,1) Fundamentals of Programming
	Tổng				**17**	**15**	**2**		
V (20	IT154IU	Đại số tuyến tính	Linear algebra	Bắt buộc	3	3	0		Không

tín chỉ)	IT013IU	Cấu trúc dữ liệu và giải thuật	Algorithms and Data Structures	Bắt buộc	4	3	1	Phòng TN. CNTT	Môn HT IT069IU Object-Oriented Programming
	IT079IU	Nguyên lý Quản trị Cơ sở dữ liệu	Principles of Database Management	Bắt buộc	4	3	1	Phòng TN. CNTT	Môn học học trước IT116IU (3,1) C/C++ Programming hoặc IT149IU (3,1) Fundamentals of Programming
	MA003IU	Toán 2	Calculus 2	Bắt buộc	4	4	0		Môn TQ MA 001IU Calculus 1
	PE015IU	Triết học Mác-Lênin	Philosophy Marx - Lenin	Bắt buộc	3	3	0		Không
	PE016IU	Kinh tế chính trị Mác-Lênin	Marxist – Leninist Political Economy	Bắt buộc	2	2	0		Môn SH PE015IU Philosophy Marx - Lenin
	Tổng				**20**	**18**	**2**		
VI (17	IT089IU	Cấu trúc máy tính	Computer Architecture	Bắt buộc	4	3	1	Phòng TN.	Không

tín chỉ)								CNTT	
	IT091IU	Mạng máy tính	Computer Networks	Bắt buộc	4	3	1	Phòng TN. CNTT	Môn học HT IT116IU (3,1) C/C++ Programming hoặc IT149IU (3,1) Fundamentals of Programming
	IT093IU	Phát triển ứng dụng Web	Web Application Development	Bắt buộc	4	3	1	Phòng TN. CNTT	Môn học học trước IT079IU (3,1) Principles of Database Management và IT069IU (3,1) Object-Oriented Programming
	MA026IU	Xác suất, thống kê và quá trình ngẫu nhiên	Probability, Statistic & Random Process	Bắt buộc	3	3	0		Không
	PE017IU	Chủ nghĩa xã	Scientific Socialism	Bắt buộc	2	2	0		Môn TQ PE015IU,

		hội khoa học							PE016IU Triết học Mác-Lênin, Kinh tế chính trị Mác-Lênin
	Tổng				**17**	**14**	**3**		
VII (17 tín chỉ)	IT017IU	Hệ điều hành	Operating System	Bắt buộc	4	3	1	Phòng TN.CNTT	Môn HT IT089IU Computer Architecture IT013IU Algorithms and Data Structures
	IT096IU	Lập trình mạng	Net-Centric Programming	Bắt buộc	4	3	1	Phòng TN.CNTT	Môn HT IT091I Computer Networks
	IT125IU	Quản trị hệ thống mạng	System & Network Administration	Bắt buộc	4	3	1	Phòng TN.CNTT	Môn HT IT091I Computer Networks

	PH014IU	Vật lý 2	Physics 2	Bắt buộc	2	2	0		Không
	PT002IU	Giáo dục thể chất 2	Physical Training 2	Bắt buộc	3	0	3		Không
	Tổng				**17**	**11**	**6**		
VIII (20 tín chỉ)		Môn tự chọn 1	Elective 1	Tự chọn	4	3	1	Phòng TN. CNTT	
	IT094IU	Quản lý Hệ thống thông tin	Information System Management	Bắt buộc	4	3	1	Phòng TN. CNTT	
	IT117IU	Bảo mật hệ thống và mạng	System and Network Security	Bắt buộc	4	3	1	Phòng TN. CNTT	
	PH015IU	Vật lý 3	Physics 3	Bắt buộc	3	3	0		Môn TQ Physics 1; Môn SH Physics 3 Laboratory
	PH016IU	Thực hành Vật lý 3	Physics 3 Laboratory	Bắt buộc	1	0	1	Phòng TN. Vật lý	Môn SH PH015IU Physics 3
	PE018IU	Lịch sử Đảng Cộng	History of Vietnamese Communist Party	Bắt buộc	2	2	0		Môn TQ PE017IU Scientifi

		Sản Việt Nam							c Socialism
	PE019IU	Tư tưởng Hồ Chí Minh	Ho Chi Minh's Thoughts	Bắt buộc	2	2	0		Môn TQ PE015IU, PE016IU, PE017IU
	Tổng				**20**	**16**	**4**		
Hè	IT082IU	Thực tập công nghiệp	Internship	Bắt buộc	3	0	3		Không
	Tổng				**3**	**0**	**3**		
IX (17 tín chỉ)		Môn tự chọn 2	Elective 2	Tự chọn	4	3	1	Phòng TN. CNTT	Không
	IT159IU	Trí thông minh nhân tạo	Artificial intelligence	Bắt buộc	4	3	1	Phòng TN. CNTT	Môn học học trước IT069IU (3,1) Object-Oriented Programming
	IT139IU	Tính toán phân tán	Scalable and Distributed Computing	Bắt buộc	4	3	1	Phòng TN. CNTT	Không
	PH012IU	Vật lý 4	Physics 4	Bắt buộc	2	2	0		Môn TQ PH013IU Physics 1

	IT120IU	Khởi nghiệp	Entrepreneurship	Bắt buộc	3	3	0		Không
	Tổng				**17**	**14**	**3**		
X (14 tín chỉ)	IT083IU	Thực tập tốt nghiệp	Special Study of the Field	Bắt buộc	3	0	3		Không
		Môn tự chọn 3	Elective 3	Tự chọn	4	3	1	Phòng TN. CNTT	Không
	IT134IU	Internet vạn vật	Internet of Things	Bắt Buộc	4	3	1	Phòng TN. CNTT	Môn HT IT091I Computer Networks
	PE020IU	Đạo đức và kỹ năng nghề nghiệp	Engineering Ethics and Professional Skills	Bắt buộc	3	3	0		Không
	Tổng				**14**	**9**	**5**		
XI (13 tín chỉ)	IT058IU	Luận văn tốt nghiệp	Thesis	Bắt buộc	10	0	10		Môn TQ IT083IU Special Study of the Field
	PE021IU	Pháp luật đại cương	General Law	Bắt Buộc	3	3	0		Không
	Tổng				**13**	**3**	**10**		
	TỔNG CỘNG				**156**	**114**	**42**		

10.8. Trình độ IE0 chuyên ngành Kỹ Thuật Máy tính

Bảng 13. Kế hoạch giảng dạy đối với người học đạt trình độ IE0 chuyên ngành Kỹ Thuật Máy tính

Học kỳ	**Mã MH**	**Tên môn học (MH)**		**Loại MH (bắt buộc /tự chọn)**	**Tín chỉ**			**Phòng TN**	**Chi chú / Môn học tiên quyết (TQ)/ Môn học học trước (HT)/ Môn học song hành (SH)**
		Tiếng Việt	**Tiếng Anh**		**Tổng cộng**	**Lý thuyết**	**Thực hành/ Thí nghiệm**		
I (34 tín chỉ)	ENTP00	Tiếng Anh tăng cường 0	Intensive English 0	Bắt buộc	17	17	0		
	ENTP01	Tiếng Anh tăng cường 1	Intensive English 1	Bắt buộc	17	17	0		
	Tổng				**34**	**34**	**0**		Không tính vào TC
II (17 tín chỉ)	ENTP02	Tiếng Anh tăng cường 2	Intensive English 2	Bắt buộc	17	17	0		
	Tổng				**17**	**17**	**0**		Không tính vào TC
III (18	MA001IU	Toán 1	Calculus 1	Bắt buộc	4	4	0		Không

tín chỉ)	EN008IU + EN007IU	Tiếng Anh chuyên ngành 1 (nghe + viết)	Academic English 1 (listening + writing skills)	Bắt buộc	4	4	0		Không
	IT064IU	Nhập môn Tin học	Introduction to Computing	Bắt buộc	3	3	0		Không
	IT116IU	Lập trình C/C++	C/C++ Programming	Bắt buộc	4	3	1	Phòng TN. CNTT	Không
	PT001IU	Giáo dục thể chất 1	Physical Training 1	Bắt buộc	3	0	3		Không
	Tổng				**18**	**14**	**4**		
IV (17 tín chỉ)	IT153IU	Toán rời rạc	Discrete Mathematics	Bắt buộc	3	3	0		Môn học học trước IT116IU (3,1) C/C++ Programming hoặc IT149IU (3,1) Fundamentals of Programming
	PH013IU	Vật lý 1	Physics 1	Bắt buộc	2	2	0		Không
	IT067IU	Thiết kế logic số	Digital Logic Design	Bắt buộc	3	3	0		Môn SH IT099IU / EE054IU Digital Logic Design Laboratory

	IT099IU	Thực hành Thiết kế logic số	Digital Logic Design Laboratory	Bắt buộc	1	0	1	Phòng TN. ĐTVT	Môn SH IT067IU Digital Logic Design
	IT069IU	Lập trình hướng đối tượng	Object-Oriented Programming	Bắt buộc	4	3	1	Phòng TN. CNTT	Môn học HT IT116IU (3,1) C/C++ Programming hoặc IT149IU (3,1) Fundamentals of Programming
	EN012IU + EN011IU	Tiếng Anh chuyên ngành 2 (nói + viết)	Academic English 2 (speaking + writing skills)	Bắt buộc	4	4	0		Môn HT EN008IU + EN007IU Academic English 1 (listening + writing skills)
	Tổng				**17**	**15**	**2**		
V (20 tín chỉ)	IT154IU	Đại số tuyến tính	Linear algebra	Bắt buộc	3	3	0		Không
	MA003IU	Toán 2	Calculus 2	Bắt buộc	4	4	0		Môn HT MA001IU Calculus 1
	IT013IU	Cấu trúc dữ liệu và giải thuật	Algorithms and Data Structures	Bắt buộc	4	3	1	Phòng TN. CNTT	Môn HT IT069IU Object-Oriented Programming

	IT068IU	Nguyên lý mạch điện 1	Principle of Electrical Engineering I	Bắt buộc	3	3	0		Môn SH Principle of Electrical Engineering I Laboratory
	IT098IU	Thực hành nguyên lý mạch điện 1	Principle of Electrical Engineering I Laboratory	Bắt buộc	1	0	1	Phòng TN. CNTT	Môn SH Principle of Electrical Engineering I
	PE015IU	Triết học Mác-Lênin	Philosophy Marx - Lenin	Bắt buộc	3	3	0		Không
	PE016IU	Kinh tế chính trị Mác-Lênin	Marxist – Leninist Political Economy	Bắt buộc	2	2	0		Môn SH PE015IU Philosophy Marx - Lenin
	Tổng				**20**	**18**	**2**		
VI (17 tín chỉ)	IT091IU	Mạng máy tính	Computer Networks	Bắt buộc	4	3	1	Phòng TN. CNTT	Môn học học trước IT116IU (3,1) C/C++ Programming hoặc IT149IU (3,1) Fundamentals of Programming
	IT089IU	Cấu trúc máy tính	Computer Architecture	Bắt buộc	4	3	1	Phòng TN. CNTT	Không
	IT074IU	Linh kiện điện tử	Electronic Devices	Bắt buộc	3	3	0		Môn HT IT068IU Principle of

									Electrical Engineering I; Môn SH IT101IU Electronic Devices Laboratory
	IT101IU	Thực hành linh kiện điện tử	Electronic Devices Laboratory	Bắt buộc	1	0	1	Phòng TN. CNTT	Môn SH IT074IU Electronic Devices
	PE017IU	Chủ nghĩa xã hội khoa học	Scientific Socialism	Bắt buộc	2	2	0		Môn HT PE015IU, PE016IU Triết học Mác-Lênin, Kinh tế chính trị Mác-Lênin
	MA026IU	Xác suất, thống kê và quá trình ngẫu nhiên	Probability, Statistic & Random Process	Bắt buộc	3	3	0		Không
	Tổng				**17**	**14**	**3**		
VII (17 tín chỉ)	PH014IU	Vật lý 2	Physics 2	Bắt buộc	2	2	0		Không
	IT017IU	Hệ điều hành	Operating System	Bắt buộc	4	3	1	Phòng TN. CNTT	Môn HT IT089IU Computer Architecture IT013IU Algorithms and Data Structures

	IT079IU	Nguyên lý Quản trị Cơ sở dữ liệu	Principles of Database Management	Bắt buộc	4	3	1	Phòng TN. CNTT	Môn học học trước IT116IU (3,1) C/C++ Programming hoặc IT149IU (3,1) Fundamentals of Programming
	IT128IU	Hệ thống vi xử lý	Micro-processing Systems	Bắt buộc	3	3	0		Môn HT IT067IU Digital Logic Design; Môn SH Micro-processing Systems Laboratory
	IT129IU	Thực hành hệ thống vi xử lý	Micro-processing Systems Laboratory	Bắt buộc	1	0	1	Phòng TN. CNTT	Môn SH Micro-processing Systems
	PT002IU	Giáo dục thể chất 2	Physical Training 2	Bắt buộc	3	0	3		Không
	Tổng				**17**	**11**	**6**		
VIII (20 tín chỉ)		Môn tự chọn 1	Elective 1		4	3	1		Không
	IT105IU	Thiết kế hệ thống số	Digital System Design	Bắt buộc	3	3	0		Môn HT IT067IU Digital Logic Design

									Môn SH Digital System Design Laboratory
	IT106IU	Thực hành thiết kế hệ thống số	Digital System Design Laboratory	Bắt buộc	1	0	1	Phòng TN. CNTT	Môn SH Digital System Design
	IT115IU	Hệ thống nhúng	Embedded Systems	Bắt buộc	3	3	0	Phòng TN. CNTT	Môn HT IT128IU Micro-processing Systems; Môn SH Embedded Systems Laboratory
	IT127IU	Thực hành hệ thống nhúng	Embedded Systems Laboratory	Bắt buộc	1	0	1		Môn SH Embedded Systems
	PH015IU	Vật lý 3	Physics 3	Bắt buộc	3	3	0		Môn HT Physics 1; Môn SH Physics 3 Laboratory
	PH016IU	Thực hành Vật lý 3	Physics 3 Laboratory	Bắt buộc	1	0	1	Phòng TN. Vật lý	Môn SH PH015IU Physics 3
	PE018IU	Lịch sử Đảng Cộng Sản Việt Nam	History of Vietnamese Communist Party	Bắt buộc	2	2	0		Môn HT PE015IU, PE016IU, PE017IU

	PE019IU	Tư tưởng Hồ Chí Minh	Ho Chi Minh's Thoughts	Bắt buộc	2	2	0		Môn HT PE015IU, PE016IU, PE017IU
	Tổng				**20**	**16**	**4**		
Hè	IT082IU	Thực tập công nghiệp	Internship	Bắt buộc	3	0	3		Không
	Tổng				**3**	**0**	**3**		
IX (16 tín chỉ)		Môn tự chọn 2	Elective 2	Tự chọn	4	3	1	Phòng TN. CNTT	Không
	IT110IU	Khái niệm thiết kế VLSI	Concepts in VLSI Design	Bắt buộc	3	3	0	Phòng TN. CNTT	Môn HT IT067IU Digital Logic Design; Môn SH IT126IU Concepts in VLSI Design Laboratory
	IT126IU	Thực hành khái niệm thiết kế VLSI	Concepts in VLSI Design Laboratory	Bắt buộc	1		1	Phòng TN. CNTT	Môn SH IT110IU Concepts in VLSI Design
	IT103IU	Xử lý tín hiệu số	Digital Signal Processing	Bắt buộc	4	3	1	Phòng TN. CNTT	Không
	IT159IU	Trí thông minh nhân tạo	Artificial intelligence	Bắt buộc	4	3	1	Phòng TN. CNTT	Môn học học trước IT069IU (3,1) Object-

									Oriented Programming
	Tổng				**16**	**12**	**4**		
X (15 tín chỉ)	IT083IU	Thực tập tốt nghiệp	Special Study of the Field	Bắt buộc	3	0	3		Không
	IT134IU	Internet vạn vật	Internet of Things	Bắt Buộc	4	3	1	Phòng TN. CNTT	Môn HT IT091I Computer Networks
	IT120IU	Khởi nghiệp	Entrepreneurship	Bắt buộc	3	3	0		Không
	PH012IU	Vật lý 4	Physics 4	Bắt buộc	2	2	0		Môn HT PH013IU Physics 1
	PE020IU	Đạo đức và kỹ năng nghề nghiệp	Engineering Ethics and Professional Skills	Bắt buộc	3	3	0		Không
	Tổng				**15**	**11**	**4**		
XI (13 tín chỉ)	IT058IU	Luận văn tốt nghiệp	Thesis	Bắt buộc	10	0	10		Môn HT IT083IU Special Study of the Field
	PE021IU	Pháp luật đại cương	General Law	Bắt Buộc	3	3	0		Không
	Tổng				**13**	**3**	**10**		
	TỔNG CỘNG				**156**	**114**	**42**		

11. Ma trận các môn học và chuẩn đầu ra (kỹ năng)

Mức độ đóng góp của các môn học vào chuẩn đầu ra của CTĐT ngành Công nghệ Thông tin được trình bày như Bảng 14.

Bảng 14. Đóng góp của các môn học vào CĐR của CTĐT chuyên ngành Kỹ thuật Mạng

STT	Mã môn học	Tên môn học (MH)	Chuẩn đầu ra (ABET)					
		Tiếng Việt	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
I	**Kiến thức giáo dục đại cương**							
I.1	***Các môn lý luận chính trị***							
1	PE015IU	Triết học Mác-Lênin				xx		
2	PE016IU	Kinh tế chính trị Mác-Lênin				xx		
3	PE017IU	Chủ nghĩa xã hội khoa học				xx		
4	PE018IU	Lịch sử Đảng Cộng Sản Việt Nam				x		
5	PE019IU	Tư tưởng Hồ Chí Minh				xx		
I.2	***Khoa học xã hội - Nhân văn - Nghệ thuật***							
6	PE021IU	Pháp luật đại cương				xx	x	
I.3	***Ngoại ngữ***							
7	EN008IU	Tiếng Anh chuyên ngành 1 (kỹ năng nghe)			xxx			
8	EN007IU	Tiếng Anh chuyên ngành 1 (kỹ năng viết)			xxx			
9	EN012IU	Tiếng Anh chuyên ngành 2 (kỹ năng nói)			xxx			
10	EN011IU	Tiếng Anh chuyên ngành 2 (kỹ năng viết)			xxx			
I.4	***Toán - Khoa học tự nhiên - Môi trường***							
11	MA001IU	Toán 1	xx		x			
12	MA003IU	Toán 2	xx		x			
13	IT154IU	Đại số tuyến tính	xx					

14	MA026IU	Xác suất, thống kê và quá trình ngẫu nhiên	xx	x				
15	IT153IU	Toán rời rạc	x	x				
16	PH013IU	Vật lý 1	x					
	PH014IU	Vật lý 2	x					
17	PH015IU	Vật lý 3	x					
18	PH016IU	Thực hành Vật lý 3	x					
19	PH012IU	Vật lý 4	x					
II	**Khối kiến thức cơ sở ngành**							
20	IT064IU	Nhập môn Tin học	x			x	x	
21	IT116IU	Lập trình C/C++	x	xxx			x	
22	IT067IU	Thiết kế logic số	x	x				x
23	IT099IU	Thực hành Thiết kế logic số	x	x				x
24	IT069IU	Lập trình hướng đối tượng	xx	xxx				x
25	IT013IU	Cấu trúc dữ liệu và giải thuật	xxx	xx				x
26	IT079IU	Nguyên lý Quản trị Cơ sở dữ liệu	xxx	xxx			xx	
27	IT089IU	Kiến trúc máy tính	x	x				x
28	IT091IU	Mạng máy tính	xx	xxx			x	
29	IT017IU	Hệ điều hành	x	x				
III	**Kiến thức chuyên ngành**							
30	IT094IU	Quản lý hệ thống thông tin	x				xx	x
31	IT093IU	Phát triển ứng dụng Web	x	x			x	x
32	IT096IU	Lập trình Mạng	x	xxx				x
33	IT117IU	Bảo mật hệ thống và mạng	x	x	x	x		
34	IT125IU	Quản trị hệ thống mạng	xxx		x	xxx		
35	IT139IU	Tính toán phân tán	x	x				x
36	IT134IU	Internet vạn vật		xxx			xx	x

37	IT159IU	Trí thông minh nhân tạo	x	x				x
IV	**Kiến thức tự chọn**							
38		Tự chọn 1						
39		Tự chọn 2						
40		Tự chọn 3						
V	**Kiến thức bổ trợ**							
41	IT120IU	Khởi nghiệp	x			x		
42	PE020IU	Đạo đức và kỹ năng nghề nghiệp				xx		
VI	**Nghiên cứu, thực tập và tự chọn tốt nghiệp**							
VI.1	***Các môn thực tập***							
43	IT082IU	Thực tập công nghiệp				x		x
44	IT083IU	Thực tập tốt nghiệp	xxx	xx				x
VI.2	***Tự chọn tốt nghiệp (sinh viên chọn luận văn tốt nghiệp hoặc đồ án tốt nghiệp + 01 môn tự chọn, tổng cộng 7 tín chỉ)***							
45	IT058IU	Luận văn tốt nghiệp	xxx	xxx				x

Bảng 14. Đóng góp của các môn học vào CĐR của CTĐT chuyên ngành Kỹ thuật Máy tính

STT	**Mã môn học**	**Tên môn học (MH)**	**Chuẩn đầu ra (ABET)**					
		Tiếng Việt	**PLO1**	**PLO2**	**PLO3**	**PLO 4**	**PLO 5**	**PLO 6**
I	**Kiến thức giáo dục đại cương**							
I.1	***Các môn lý luận chính trị***							
1	PE015IU	Triết học Mác-Lênin				xx		
2	PE016IU	Kinh tế chính trị Mác-Lênin				xx		
3	PE017IU	Chủ nghĩa xã hội khoa học				xx		
4	PE018IU	Lịch sử Đảng Cộng Sản Việt Nam				x		
5	PE019IU	Tư tưởng Hồ Chí Minh				xx		
I.2	***Khoa học xã hội - Nhân văn - Nghệ thuật***							

6	PE021IU	Pháp luật đại cương				xx	x	
1.3	***Ngoại ngữ***							
7	EN008IU	Tiếng Anh chuyên ngành 1 (kỹ năng nghe)			xxx			
8	EN007IU	Tiếng Anh chuyên ngành 1 (kỹ năng viết)			xxx			
9	EN012IU	Tiếng Anh chuyên ngành 2 (kỹ năng nói)			xxx			
10	EN011IU	Tiếng Anh chuyên ngành 2 (kỹ năng viết)			xxx			
I.4	***Toán - Khoa học tự nhiên - Môi trường***							
11	MA001IU	Toán 1	xx		x			
12	MA003IU	Toán 2	xx		x			
13	IT154IU	Đại số tuyến tính	xx					
14	MA026IU	Xác suất, thống kê và quá trình ngẫu nhiên	xx	x				
15	IT153IU	Toán rời rạc	x	x				
16	PH013IU	Vật lý 1	x					
17	PH014IU	Vật lý 2	x					
18	PH015IU	Vật lý 3	x					
19	PH016IU	Thực hành Vật lý 3	x					
20	PH012IU	Vật lý 4	x					
II	**Khối kiến thức cơ sở ngành**							
21	IT064IU	Nhập môn Tin học	x			x	x	
22	IT116IU	Lập trình C/C++	x	xxx			x	
23	IT067IU	Thiết kế logic số	x	x				x
24	IT099IU	Thực hành Thiết kế logic số	x	x				x
25	IT069IU	Lập trình hướng đối tượng	xx	xxx				x
26	IT013IU	Cấu trúc dữ liệu và giải thuật	xxx	xx				x
27	IT079IU	Nguyên lý Quản trị Cơ sở dữ liệu	xxx	xxx			xx	

28	IT089IU	Kiến trúc máy tính	x	x				x
29	IT091IU	Mạng máy tính	xx	xxx			x	
30	IT017IU	Hệ điều hành	x	x				
III	**Kiến thức chuyên ngành**							
31	IT068IU	Các nguyên lý mạch điện 1	x	x				x
32	IT098IU	Thực hành các nguyên lý mạch điện 1	x	x				x
33	IT074IU	Linh kiện điện tử	x	x				x
34	IT101IU	Thực hành linh kiện điện tử	x	x				x
35	IT105IU	Thiết kế hệ thống số	x	x				x
36	IT106IU	Thực hành thiết kế hệ thống số	x	x				x
37	IT128IU	Hệ thống vi xử lý	x	x	x			x
38	IT129IU	Thực hành hệ thống vi xử lý	x	x	x			x
39	IT110IU	Khái niệm thiết kế VLSI	x	x	x			x
40	IT126IU	Thực hành khái niệm thiết kế VLSI	x	x	x			x
41	IT115IU	Hệ thống nhúng		x				x
42	IT127IU	Thực hành hệ thống nhúng		x				x
43	IT103IU	Xử lý tín hiệu số	x	x				x
44	IT134IU	Internet vạn vật		xxx			xx	x
45	IT159IU	Trí thông minh nhân tạo	x	x				x
IV	**Kiến thức tự chọn**							
46		Tự chọn 1						
47		Tự chọn 2						
V	**Kiến thức bổ trợ**							
48	IT120IU	Khởi nghiệp	x			x		
49	PE020IU	Đạo đức và kỹ năng nghề nghiệp				xx		
VI	**Nghiên cứu, thực tập và tự chọn tốt nghiệp**							
VI.1	***Các môn thực tập***							
50	IT082IU	Thực tập công nghiệp				x		x

51	IT083IU	Thực tập tốt nghiệp	xxx	xx				x
VI.2	***Tự chọn tốt nghiệp (sinh viên chọn luận văn tốt nghiệp hoặc đồ án tốt nghiệp + 01 môn tự chọn, tổng cộng 7 tín chỉ)***							
52	IT058IU	Luận văn tốt nghiệp	xxx	xxx				x

12. Mô tả vắn tắt nội dung và khối lượng các môn học (số thứ tự của môn học tương ứng với số thứ tự của môn học trong nội dung chương trình đào tạo)

12.1 PE015IU - Triết học Mác-Lênin (Philosophy Marx - Lenin)

Số tín chỉ : 3 (3LT + 0TH)
Môn học tiên quyết: không
Mô tả môn học:
Môn học trang bị cho sinh viên những kiến thức cơ bản về triết học Mác-Lênin.

12.2 PE016IU - Kinh tế chính trị Mác-Lênin (Marxist – Leninist Political Economy)

Số tín chỉ : 2 (2LT + 0TH)
Môn học song hành: Triết học Mác-Lênin
Mô tả môn học:
Nội dung chương trình gồm 6 chương: Trong đó chương 1 bàn về đối tượng, phương pháp nghiên cứu và chức năng của Kinh tế chính trị Mác-Lênin. Từ chương 2 đến chương 6 trình bày nội dung cốt lõi của Kinh tế chính trị Mác-Lênin theo mục tiêu của môn học. Cụ thể các vấn đề như: Hàng hóa, thị trường và vai trò của các chủ thể trong nền kinh tế thị trường; Sản xuất giá trị thặng dư trong nền kinh tế thị trường; Cạnh tranh và độc quyền trong nền kinh tế thị trường; Kinh tế thị trường định hướng xã hội chủ nghĩa và các quan hệ lợi ích kinh tế ở Việt Nam; Công nghiệp hóa, hiện đại hóa và hội nhập kinh tế quốc tế ở Việt Nam.

12.3 PE017IU - Chủ nghĩa xã hội khoa học (Scientific Socialism)

Số tín chỉ : 2 (2LT + 0TH)
Môn học trước: Triết học Mác-Lênin, Kinh tế chính trị Mác-Lênin
Mô tả môn học:
Môn học trang bị cho sinh viên những kiến thức cơ bản về chủ nghĩa xã hội khoa học.

12.4 PE018IU - Lịch sử Đảng Cộng Sản Việt Nam (History of Vietnamese Communist Party)

Số tín chỉ : 2 (2LT + 0TH)
Môn học trước: Triết học Mác-Lênin, Kinh tế chính trị Mác-Lênin, Chủ nghĩa xã hội khoa học.
Mô tả môn học:
Môn học trang bị cho sinh viên những kiến thức cơ bản về lịch sử Đảng Cộng Sản Việt Nam.

12.5 PE019IU - Tư tưởng Hồ Chí Minh (Ho Chi Minh's Thoughts)

Số tín chỉ : 2 (2LT + 0TH)
Môn học trước: Triết học Mác-Lênin, Kinh tế chính trị Mác-Lênin, Chủ nghĩa xã hội khoa học.
Mô tả môn học:
Môn học trang bị cho sinh viên những kiến thức cơ bản về: đối tượng, phương pháp nghiên cứu và ý nghĩa học tập môn tư tưởng Hồ Chí Minh; về cơ sở, quá trình hình thành và phát triển tư tưởng Hồ Chí Minh; về độc lập dân tộc và đoàn kết quốc tế; về văn hóa, đạo đức, con người.

12.6 MA001IU - Toán 1 (Calculus 1)

Số tín chỉ : 4 (4LT + 0TH)
Môn học tiên quyết: Không
Mô tả môn học:
Nội dung chính: Hàm số, Giới hạn, Tính liên tục, Đạo hàm, Đạo hàm cho các hàm cơ bản, Qui tắc tính đạo hàm, Ứng dụng của đạo hàm, Quy tắc L'hospital, Tối ưu, Phương pháp Newton, Tích phân, Tích phân xác định, Các định lý cơ bản của giải tích, kỹ thuật tính tích phân.

12.7 MA003IU - Toán 2 (Calculus 2)

Số tín chỉ : 4 (4LT + 0TH)
Môn học tiên quyết: Toán 1
Mô tả môn học:
Dãy và chuỗi; Kiểm tra sự hội tụ; Chuỗi mủ; Chuỗi Taylor và Maclaurin; Hệ tọa độ Cartesian; Đường thẳng, Mặt và Mặt phẳng; Đạo hàm và tích phân của hàm Véctơ; Chiều dài đường cong; Mặt phẳng tham số; Mặt tiếp xúc; Véctơ Gradient; Cực trị; Nhân tử Lagrange; Tích phân bội: tích phân hai lớp, tích phân ba lớp, những kỹ thuật tính tích phân; Trường Véctơ, tích phân đường, tích phân mặt.
Số tín chỉ : 4 (3LT + 1TH)

Môn học tiên quyết: Toán 1, Toán 2
Mô tả môn học: Phương trình vi phân cấp một, phương trình vi phân cấp hai, hệ số không xác định, phương sai của tham số, phương trình vi phân tuyến tính cấp cao, nghiệm chuỗi của phương trình vi phân tuyến tính cấp hai với hệ số không là hằng, hệ phương trình tuyến tính cấp một, cơ bản về phương trình đạo hàm riêng và phương pháp tách biến, phương pháp số.

12.8 MA026IU - Xác suất, thống kê và quá trình ngẫu nhiên (Probability, Statistic & Random Process)

Số tín chỉ : 3 (3LT + 0TH)
Môn học tiên quyết: Toán 1, Toán 2
Mô tả môn học: Môn học trình bày lý thuyết xác suất theo quan điểm độ đo. Nội dung chính bao gồm kiến thức về các biến cố (độc lập, có điều kiện,…), các biến ngẫu nhiên, phân phối, kỳ vọng, phương sai và các định lý giới hạn quan trọng trong xác suất (định lý giới hạn trung tâm, luật số lớn, …).

12.9 PH013IU - Vật lý 1 (Physics 1)

Số tín chỉ : 2 (2LT + 0TH)
Môn học tiên quyết: Không
Mô tả môn học:
Khảo sát động học, động lực học, năng lượng học của chuyển động của chất điểm và của vật rắn. Khảo sát động lực học lưu chất, tính chất của khí lí tưởng, và các nguyên lí nhiệt động lực học.

12.10 PH014IU - Vật lý 2 (Physics 2)

Số tín chỉ : 2 (2LT + 0TH)
Môn học tiên quyết: Không
Mô tả môn học:
Cung cấp những kiến thức cơ sở về chuyển động của lưu chất, cũng như các định luật của chất khí lí tưởng, và các nguyên lí của nhiệt động lực học. Sinh viên cần nắm vững các kiến thức này và vận dụng trong những tình huống thực tế liên quan đến cơ học lưu chất và nhiệt động lực học.

12.11 PH015IU & PH016IU - Vật lý 3 (Physics 3 + Physics 3 Laboratory)

Số tín chỉ : 4 (3LT + 1TH)
Môn học tiên quyết: Vật lý 1
Mô tả môn học:
Môn học cung cấp cho sinh viên những kiến thức cơ bản về điện và từ.

12.12 PH012IU - Vật lý 4 (Physics 4)

Số tín chỉ : 2 (2LT + 0TH)
Môn học tiên quyết: Vật lý 1
Mô tả môn học:
Môn học cung cấp cho sinh viên những kiến thức cơ bản về sóng và lượng tử.

12.13 PE020IU - Đạo đức và kỹ năng nghề nghiệp (Engineering Ethics and Professional Skills)

Số tín chỉ: 3 (3LT + 0TH)
Môn học tiên quyết: không
Mô tả môn học: Môn học thiết kế để giới thiệu cho sinh viên kỹ thuật về khái niệm, lý thuyết và thực hành về đạo đức kỹ thuật. Môn học giúp sinh viên khám phá ra mối quan hệ giữa đạo đức và kỹ thuật cũng như việc áp dụng lý thuyết đạo đức cổ điển và ra quyết định cho các vấn đề kỹ thuật trong quá trình học thuật cũng như trong nghề nghiệp. Học tập và hiểu đạo đức nghề nghiệp cũng là một phần trong sự phát triển của sinh viên với tư cách là một kỹ sư. Sinh viên phải có khả năng mở rộng hiểu biết và tư duy cởi mở. Điều quan trọng là sinh viên phải học cách chia sẻ ý tưởng kể cả khi có sự bất đồng, do đó hoạt động thực hành nhóm sẽ được chú trọng trong môn học này.

12.14 EN007IU & EN008IU - Tiếng anh chuyên ngành 1 (Academic English 1)

Số tín chỉ : 4 (4LT + 0TH)
Môn học tiên quyết: không
Mô tả môn học:
Môn học nhằm nâng cao kỹ năng viết trình độ tiền nâng cao (pre-advanced). Chương trình tập trung vào việc xây dựng bài luận dựa trên các kỹ năng viết như: làm dàn bài, viết câu luận đề, kết nối và sắp xếp trình tự các đoạn, dung từ và cụm từ nối để tạo sự mạch lạc cho bài văn. Các thể loại bao gồm: miêu tả người, đồ vật, qui trình, trình bày ý kiến, so sánh và đối chiếu, nguyên nhân – kết quả, vấn đề - giải pháp, nghị luận. Những kỹ năng nghe tiếng Anh học thuật, ghi chú, và thảo luận sẽ giúp sinh viên làm quen với những khó khăn trong việc học tiếng Anh ở đại học. Sinh viên sẽ học các kỹ năng cần thiết cho sinh viên đại học quốc tế, bao gồm: nghe bài giảng chủ động, ghi chú hiệu quả, tham gia thảo luận tự tin. Cùng với các kỹ năng nghe, sinh viên cũng sẽ trau giồi thêm vốn từ vựng học thuật.

12.15 EN011IU & EN012IU - Tiếng anh chuyên ngành 2 (Academic English 2)

Số tín chỉ : 4 (4LT + 0TH)
Môn học tiên quyết: Tiếng anh chuyên ngành 1
Mô tả môn học:

Khóa học nhằm cung cấp một cách tổng quát cấu trúc của một bài viết báo cáo nghiên cứu, từng bước giúp sinh viên hoàn tất một bài viết cụ thể trong lĩnh vực của mình. Nội dung của khóa học bao gồm: các thành phần của bài báo cáo, kỹ năng chọn và giới hạn đề tài, viết câu luận đề, làm dàn bài, tìm và dẫn chứng tài liệu, ghi chú, viết mở bài, nội dung chính và kết luận, viết và sửa chữa bản nháp. Sinh viên sẽ thực hành trên các đề tài liên quan đến môn học của mình. Môn học cung cấp cho sinh viên các chiến lược thiết thực sử dụng trong việc thuyết trình. Ngòai ra sinh viên được giúp đỡ hình thành kỹ năng lắng nghe, nhận xét và nêu ý kiến phản hồi đối với các bài thuyết trình khác trong lớp.

12.16 IT064IU - Nhập môn Tin học (Introduction to computing)

Số tín chỉ: 3 (3 LT+0TH)
Môn học tiên quyết: Không
Mô tả môn học:
Môn học giới thiệu những khái niệm cơ bản, những mô hình và xu hướng trong ngành công nghiệp Công nghệ thông tin. Ngoài ra, sinh viên được giới thiệu về các chuyên ngành, về cơ cấu các môn học trong mỗi chuyên ngành, ý nghĩa của các môn học, các nghề nghiệp liên quan đến mỗi chuyên ngành, định hướng nghề nghiệp cho sinh viên.

12.17 IT116IU - Lập trình C/C++ (C/C++ Programming)

Số tín chỉ: 4 (3 LT+1TH)
Môn học tiên quyết: Không
Mô tả môn học:
Môn học giúp phát triển những giải thuật và giới thiệu những nguyên tắc trong lập trình dùng C và C++. Các chủ đề bao gồm: giới thiệu máy tính và điện toán, phát triển chương trình, cú pháp ngôn ngữ lập trình C/C++ và các phương pháp số căn bản cho kỹ sư. Môi trường Unix và một số tiện ích cũng được giới thiệu trong môn học này.

12.18 IT153IU - Toán rời rạc (Discrete Mathematics)

Số tín chỉ: 3 (3LT + 0TH)
Môn học học trước: Toán 1, Toán 2, Lập trình C/C++
Mô tả môn học: Môn học giúp sinh viên phát triển khả năng tư duy, suy nghĩ và diễn giải dựa trên toán học, logic, ứng dụng khả năng này để phân tích, xử lý và giải quyết các đối tượng rời rạc trong thực tế. Đây là khóa học hướng ứng dụng dựa trên việc nghiên cứu các sự kiện xảy ra là nhỏ hay rời rạc phân đoạn trong khoa học, kinh tế, công nghiệp…. Sinh viên sẽ được giới thiệu các công cụ toán học về toán rời rạc như: lý thuyết tổ hợp; lý thuyết quan hệ (quan hệ tương đương, quan hệ sắp xếp); bài toán đếm (giới thiệu về bài toán và phần mở rộng về hệ thức truy hồi); bài toán tồn tại; bài toán liệt kê; lý thuyết đại số Boole; lý thuyết đồ thị và cây. Các ứng dụng thực tế sẽ được giới thiệu trong suốt khóa học.

12.19 IT067IU & IT099IU - Thiết kế logic số và thực hành (Digital Logic Design + Digital Logic Design Laboratory)

Số tín chỉ: 4 (3 LT+1TH)
Môn học tiên quyết: không
Môn học tương đương: EE053IU & EE054IU
Mô tả môn học:
Môn học cung cấp cho sinh viên các kiến thức về số nhị phân, đại số Boolean, bìa Karnaugh, mạch tổ hợp, mạch tổ hợp MSI, logis tuần tự, thiết kế máy trạng thái đồng bộ, mạch MSI tuần tự.

12.20 IT069IU - Lập trình hướng đối tượng (Object Oriented Programming)

Số tín chỉ: 4 (3 LT+1TH)
Môn học học trước: Lập trình C/C++ hoặc Lập trình cơ bản
Mô tả môn học:
Lập trình và các cấu trúc dữ liệu cơ bản dùng ngôn ngữ Java. Các cấu trúc điều khiển cơ bản như vòng lặp, mảng, đệ qui và con trỏ. Thiết kế hướng đối tương: lớp, thừa kế, overload và đa hình. Cấu trúc dữ liệu trừu tượng: danh sách, danh sách liên kết, chồng và hàng. Giới thiệu về phân tích giải thuật, dùng ký hiệu O, các phương pháp tìm kiếm và sắp xếp.

12.21 IT013IU - Cấu trúc dữ liệu và giải thuật (Algorithms and Data Strutures)

Số tín chỉ: 4 (3 LT+1TH)
Môn học trước: Lập trình hướng đối tượng
Mô tả môn học:
Tìm hiểu những đặc điểm quan trọng của cấu trúc dữ liệu và giải thuật. Cách sử dụng những cấu trúc này để hỗ trợ thiết kế giải thuật. Giới thiệu về các kỹ thuật tìm kiếm, sắp xếp và băm.

12.22 IT079IU - Nguyên lý Quản trị Cơ sở dữ liệu (Principle of Database Management).

Số tín chỉ: 4 (3 LT+1TH)
Môn học trước: Lập trình C/C++ hoặc Lập trình cơ bản
Mô tả môn học:
Môn học nhằm cung cấp cho người học kiến thức tổng quan về: kiến trúc Cơ sở dữ liệu (CSDL), phương pháp quản trị CSDL; các mô hình dữ liệu phân cấp, mô hình dữ liệu mạng và mô hình dữ liệu quan hệ; phương pháp thiết kế mô hình thực thể kết hợp và mô hình cơ sở dữ liệu quan hệ; các phụ thuộc hàm cho dữ liệu và cách chuẩn hóa dữ liệu, các ràng buộc

toàn vẹn dữ liệu và bảo mật dữ liệu; các cơ chế quản lý giao tác cho hệ quản trị CSDL đa người dùng; ngoài ra môn học còn giới thiệu một số hệ quản trị CSDL thông dụng như SQL Server và một số hệ quản trị CSDL thương mại khác.

12.23 IT089IU - Cấu trúc máy tính (Computer Architecture)

Số tín chỉ: 4 (3 LT+1TH)
Môn học học trước: Thiết kế logic số
Mô tả môn học: Lịch sử và các nguyên lý của cấu trúc máy tính, cấu tạo máy tính, hợp ngữ và mã máy tính, số học của máy tính, thiết kế ALU, hiệu năng của máy tính, đường dẫn dữ liệu và điều khiển, pipelining, cấu trúc phân tầng của bộ nhớ, thiết bị xuất nhập, và các bộ xử lý di động cũng như đa lõi.

12.24 IT091IU - Mạng Máy Tính (Computer Networks)

Số tín chỉ: 4 (3 LT+1TH)
Môn học học trước: Lập trình C/C++
Môn học trước: Lập trình hướng đối tượng
Mô tả môn học: Giới thiệu về mạng, cấu trúc OSI, chuyển mạch gói, mạng nội bộ, Ethernet, mạng không dây, và các giao thức mạng.

12.25 IT096IU - Lập trình mạng (Net-Centric Programming)

Số tín chỉ: 4 (3LT+1TH)
Môn học học trước: Mạng máy tính, Lập trình C/C++
Mô tả môn học: Môn học cung cấp các kiến thức cơ sở và nâng cao về các kỹ thuật lập trình mạng TCP/IP và UDP. Giúp sinh viên có khả năng xây dựng định dạng dữ liệu để thiết kế các giao thức truyền dữ liệu trên mạng. Hướng dẫn sinh viên lập trình được các ứng dụng có kết nối mạng Client/Server độc lập sử dụng ở mức socket và một số giao thức mạng cấp ứng dụng phổ biến như HTTP, FTP, DNS, Email… Môn học cũng cung cấp cho sinh viên các kỹ năng phát triển phần mềm trên các công cụ và môi trường trực quan như PyCharm, Visual Studio…

12.26 IT094IU - Quản lý Hệ thống thông tin (Information System Management)

Số tín chỉ: 4 (3 LT+1TH)
Môn học trước: Nguyên lý Quản Trị Cơ sở dữ liệu
Mô tả môn học: Môn học hướng tới việc mô tả cách mà một hệ thống thông tin được sử dụng bởi các doanh nghiệp và sự ảnh hưởng của nó đến hoạt động của doanh nghiệp. Cùng với việc trình bày và tìm hiểu về công nghệ trong hệ thống thông tin, các vấn đề cơ bản là làm cách nào để các công nghệ được dùng giải quyết các vấn đề của doanh nghiệp và các cơ hội khai thác chúng. Nội dung cụ thể gồm các vấn đề liên quan đến tổ chức, quản lý,

mạng doanh nghiệp; hạ tầng công nghệ thông tin doanh nghiệp; các hệ thống hỗ trợ quản lý và tổ chức cho doanh nghiệp số; xây dựng và quản lý hệ thống thông tin

12.27 IT017IU - Hệ điều hành (Operating System)

Số tín chỉ: 4 (3 LT+1TH)
Môn học học trước: Cấu trúc dữ liệu và giải thuật, Kiến trúc máy tính, Lập trình C/C++
Mô tả môn học: Môn học trang bị cho sinh viên khả năng định nghĩa và giải thích các nguyên lý của hệ điều hành. Hiểu về kiến trúc của một hệ điều hành. Khả năng lập trình để giao tiếp với các chức năng và dịch vụ hệ thống

12.28 IT093IU - Phát triển ứng dụng Web (Web Application Development)

Số tín chỉ: 4 (3 LT+1TH)
Môn học học trước: Lập trình hướng đối tượng, Nguyên lý Quản Trị Cơ sở dữ liệu
Mô tả môn học: Sử dụng các kiến thức và kỹ năng để phát triển ứng dụng Web dựa trên các tiện ích, công nghệ và môi trường phát triển của Java như HTML, Java Server Page, Java Bean, MVC Model. Ngoài ra còn mở rộng thêm các kiến thức liên quan đến kiến trúc của Java như Ajax và Struts. Môn học này làm nền tảng để sinh viên thực hiện các đề án môn học cũng như luận văn tốt nghiệp theo hướng Web.

12.29 IT117IU - Bảo mật hệ thống và mạng (System and Network Security)

Số tín chỉ: 4 (3LT+1TH)
Môn học học trước: Mạng máy tính
Mô tả môn học: Môn học này giới thiệu cho sinh viên các hệ thống mật mã (mã hóa đối xứng và khóa công khai), lý thuyết thông tin cơ bản, xác thực và ủy quyền, bảo mật cơ sở dữ liệu, phần mềm độc hại, tấn công từ chối dịch vụ, hệ thống phát hiện và ngăn chặn xâm nhập, tường lửa, tấn công tràn bộ đệm và bảo mật phần mềm, các tiêu chuẩn giao thức và bảo mật Internet, ứng dụng xác thực Internet và bảo mật không dây.

12.30 IT134IU - Internet vạn vật (Internet of Things)

Số tín chỉ: 4 (3LT+1TH)
Môn học học trước: Mạng máy tính
Mô tả môn học:
Môn học giải thích về kiến trúc, thành phần của mạng Internet vạn vật. Sinh viên sẽ được học về các kỹ thuật truyền thông khác nhau, từ tầm gần đến tầm xa như là Bluetooth, Zigbee, Wifi, LoRa, NB-IoT,... Ngoài ra, các kỹ thuật lưu trữ, tổ chức và phân tích dữ liệu còn được học trong môn học này. Sau đó, sinh viên sẽ được học các khái niệm, nguyên lý cơ bản và

cấu tạo cơ bản của các hệ thống IoT cho các ứng dụng công nghiệp như y tế, sản xuất, nông nghiệp, v.v..

12.31 IT074IU – Linh kiện điện tử (Electronics Devices)

Số tín chỉ: 3 (3LT + 0TH)
Môn học học trước: Nguyên lý mạch điện 1
Môn học song hành: Thực hành linh kiện điện tử
Môn tương đương: EE090IU
Mô tả môn học: Môn học này cung cấp cho sinh viên kiến thức cơ bản về các thiết bị bán dẫn và mạch vi điện tử, đặc tính của kết nối P-N, điốt Zener và mạch điốt tương tự. Lý thuyết hoạt động của MOSFET và BJT, phân cực và phân tích transistor ở trung tần.

12.32 IT101IU – Thực hành linh kiện điện tử (Electronics Devices Laboratory)

Số tín chỉ: 1 (0LT + 1TH)
Môn học học trước: Nguyên lý mạch điện 2
Môn học song hành: Linh kiện điện tử
Môn tương đương: EE091IU
Mô tả môn học: Môn học được thiết kế để cung cấp sinh viên kiến thức về các mạch điện tử sử dụng các linh kiện bán dẫn bao gồm: Diod, MOSFE và BJT nhấn mạnh yếu tố thực nghiệm kết hợp mô phỏng máy tính.

12.33 IT068IU – Nguyên lý mạch điện 1 (Principles of Electrical Engineering I)

Số tín chỉ: 3 (3LT + 0TH)
Môn học học trước: Toán 1
Môn học song hành: Thực hành nguyên lý mạch điện 1
Môn tương đương: EE051IU
Mô tả môn học: Môn học được thiết kế để cung cấp sinh viên các kiến thức về các thành phần mạch điện; nguồn độc lập; nguồn phụ thuộc; phân tích mạch một chiều và xoay chiều trạng thái ổn định; lý thuyết mạng điện; khuếch đại thuật toán; tính toán công suất.

12.34 IT098IU – Thực hành Nguyên lý mạch điện 1 (Principles of Electrical Engineering I Laboratory)

Số tín chỉ: 1 (0LT + 1TH)
Môn học học trước: Toán 1
Môn học song hành: Nguyên lý mạch điện 1
Môn tương đương: EE052IU

Mô tả môn học: Môn học được thiết kế để cung cấp sinh viên các kiến thức về các bài thực hành thí nghiệm về sử dụng thiết bị thí nghiệm: máy đo điện áp, dòng điện, trở kháng, tần số, dạng sóng. Nguyên lí cơ bản về thiết kế và mô hình hóa mạch điện.

12.35 IT105IU – Thiết kế hệ thống số (Digital System Design)

Số tín chỉ: 3 (3LT + 0TH)
Môn học học trước: Thiết kế logic số
Môn học song hành: Thực hành thiết kế hệ thống số
Môn tương đương: EE063IU
Mô tả môn học: Môn học này giới thiệu phương pháp và kỹ thuật để thiết kế hệ thống kỹ thuật số. Các chủ đề bao gồm các khái niệm cơ bản, phân tích và thiết kế hệ thống với các ngôn ngữ mô tả phần cứng (HDL). Khóa học cung cấp cái nhìn sâu sắc về thiết kế các mạch tuần tự không đồng bộ và các hệ thống đồng bộ phức tạp. Quá trình thiết kế được giới thiệu bởi các khái niệm, tài liệu và mô phỏng.

12.36 IT106IU – Thực hành thiết kế hệ thống số (Digital System Design Laboratory)

Số tín chỉ: 1 (0LT + 1TH)
Môn học học trước: Thiết kế logic số
Môn học song hành: Thiết kế hệ thống số
Môn tương đương: EE117IU
Mô tả môn học: Môn học này này giúp sinh viên hiểu rõ hơn về các kỹ thuật để thiết kế hệ thống kỹ thuật số. Môn học bao gồm các chủ đề phần mềm và phần cứng: Giới thiệu về phần mềm Maxplus II, Bộ đếm, Giới thiệu về VHDL trong Maxplus II, Đồng hồ kỹ thuật số.

12.37 IT128IU – Hệ thống vi xử lý (Micro-processing Systems)

Số tín chỉ: 3 (3LT + 0TH)
Môn học học trước: Thiết kế logic số
Môn học song hành: Thực hành hệ thống vi xử lý
Môn tương đương: EE083IU
Mô tả môn học: Môn học trang bị cho sinh viên những kiến thức cơ bản về: lập trình bằng ngôn ngữ máy và hợp ngữ, kiến trúc và tập lệnh của các hệ vi xử lý, các ứng dụng về thiết kế dùng bộ vi xử lý

12.38 IT129IU – Thực hành hệ thống vi xử lý (Micro-processing Systems Laboratory)

Số tín chỉ: 1 (0LT + 1TH)

Môn học học trước: Thiết kế logic số
Môn học song hành: Hệ thống vi xử lý
Môn tương đương: EE084IU
Mô tả môn học: Sinh viên sẽ thực hành với các chủ đề sau: ngôn ngữ máy và hợp ngữ, kiến trúc và bộ hướng dẫn; ngăn xếp, chương trình con, I / O và ngắt; nguyên tắc giao thoa ngoại vi; thiết kế với bộ vi xử lý, và các ứng dụng của hệ thống vi xử lý cho một số vấn đề thực tế.

12.39 IT115IU – Hệ thống nhúng (Embedded Systems)

Số tín chỉ: 3 (3LT + 0TH)
Môn học học trước: Thiết kế logic số, Hệ thống vi xử lý
Môn học song hành: Thực hành Hệ thống nhúng
Môn tương đương: EE104IU
Mô tả môn học: Môn học cung cấp cho sinh viên kiến thức về thiết kế các Hệ thống nhúng, cả từ góc độ phần cứng và phần mềm. Trọng tâm chính là xử lý thời gian thực cho các hệ thống xử lý tín hiệu và truyền thông. Các dự án lập trình bằng ngôn ngữ cấp cao như C / C ++ sẽ là một thành phần thiết yếu của khóa học, cũng như thiết kế phần cứng với các công cụ thiết kế hiện đại.

12.40 IT127IU – Thực hành Hệ thống nhúng (Embedded Systems Laboratory)

Số tín chỉ: 1 (0LT + 1TH)
Môn học học trước: Thiết kế logic số, Hệ thống vi xử lý
Môn học song hành: Hệ thống nhúng
Môn tương đương: EE118IU
Mô tả môn học: Môn học được thiết kế để cung cấp sinh viên các kiến thức về thực hành thí nghiệm thiết kế các Hệ thống nhúng cả về phần cứng và phần mềm. Bao gồm các giao tiếp ngoại vi, các giao thức bus, giao tiếp bộ nhớ ngoài, hệ điều hành Hệ thống nhúng, bộ lập lịch và xử lý ngắt thời gian thực, kết nối mạng hệ thống nhúng.

12.41 IT110IU – Khái niệm thiết kế VLSI (Concepts in VLSI Design)

Số tín chỉ: 3 (3LT + 0TH)
Môn học học trước: Thiết kế logic số, Điện tử kỹ thuật số
Môn học song hành: Thực hành Khái niệm thiết kế VLSI
Môn tương đương: EE066IU
Mô tả môn học: Môn học này cung cấp một giới thiệu về thiết kế chip VLSI kỹ thuật số dựa trên công nghệ CMOS và bao gồm logic xung nhịp động, phân tích thời gian MOSFET và quy tắc thiết kế bố trí. Môn học phát triển việc sử dụng các công cụ phần mềm thiết kế hỗ trợ máy tính cũng như hiểu biết về kiểm tra mạch cơ bản.

12.42 IT126IU – Thực hành Khái niệm thiết kế VLSI (Concepts in VLSI Design Laboratory)

Số tín chỉ: 1 (0LT + 1TH)
Môn học học trước: Thiết kế logic số, Điện tử kỹ thuật số
Môn học song hành: Khái niệm thiết kế VLSI
Môn tương đương: EE121IU
Mô tả môn học: Môn học này cung cấp giới thiệu về thiết kế chip VLSI kỹ thuật số dựa trên việc sử dụng các công cụ Khái niệm thiết kế VLSI để thiết kế chip vi xử lý MIPS. Môn học này sử dụng phương pháp học tập, nhấn mạnh vào kinh nghiệm thiết kế thực tế và mô phỏng máy tính.

12.43 IT103IU – Xử lý tín hiệu số (Digital Signal Processing)

Số tín chỉ: 3 (3LT + 0TH)
Môn học học trước: Tín hiệu và hệ thống
Môn học song hành: Thực hành xử lý tín hiệu số
Môn tương đương: EE092IU
Mô tả môn học: Môn học này giới thiệu về các nguyên tắc cơ bản, phương pháp và ứng dụng xử lý tín hiệu số, nhấn mạnh các khía cạnh thuật toán, tính toán và lập trình của nó. Nội dung cụ thể bao gồm: chuyển đổi từ analog sang kỹ thuật số, các khái niệm về hệ thống tuyến tính thời gian rời rạc, lọc, phân tích quang phổ của tín hiệu thời gian rời rạc và thiết kế bộ lọc.

12.44 IT125IU - Quản trị hệ thống mạng (System and Network Administration)

Số tín chỉ: 4 (3LT+1TH)
Môn học học trước: Mạng máy tính
Mô tả môn học: Môn học này giới thiệu các công nghệ mạng mới, bao gồm các cấu trúc liên kết mạng, các khái niệm triển khai giao thức và kỹ thuật quản lý. Giải thích các yếu tố và công nghệ khác nhau được sử dụng trong mạng doanh nghiệp và cách chúng liên quan với nhau. Tập trung vào các khái niệm và nguyên tắc cơ bản. Cung cấp một nền tảng kỹ thuật vững chắc để điều hướng quản lý mạng một cách thành công và áp dụng các khái niệm trên cho các tình huống cụ thể.

12.45 IT120IU - Khởi nghiệp (Entrepreneurship)

Số tín chỉ: 3 (3LT)
Môn học học trước: không
Mô tả môn học: Môn học cung cấp kiến thức về khởi tạo doanh nghiệp, tư duy sáng tạo để đưa ra sản phẩm, dịch vụ mới có liên quan đến công nghệ. Vai trò của doanh nghiệp trẻ

trong nền kinh tế và cách quản lý doanh nghiệp để khơi nguồn ý tưởng sáng tạo trong nhóm làm việc. Xây dựng và biến ý tưởng kinh doanh thành hiện thực.

12.46 IT082IU - Thực tập Công nghiệp (Internship)

Số tín chỉ: 3 (0 LT+3TH)
Điều kiện tiên quyết: sinh viên năm 3 trở lên
Mô tả môn học: Môn học nhằm tạo điều kiện cho sinh viên có cơ hội tiếp xúc với môi trường thực tế, nhằm để giải quyết những vấn đề thực tiễn trong sản xuất, cuộc sống hàng ngày. Nội dung chủ yếu bao gồm: xây dựng và quản trị hệ thống thông tin bằng web hoặc ứng dụng; tin học hóa các công tác văn phòng, công việc hang ngày; thiết kế, cài đặt vận hành mạng máy tính cho các doanh nghiệp, tổ chức. Tìm hiểu và ứng dụng các công nghệ mới.

12.47 IT083IU- Thực tập tốt nghiệp (Special Study of the Field)

Số tín chỉ: 3 (0 LT+3TH)
Điều kiện tiên quyết: đủ số tín chỉ theo quy định
Mô tả môn học: Môn học nhằm hướng dẫn sinh viên đến việc tìm hiểu phương pháp giải quyết một vấn đề tổng hợp thực tế. Nội dung hướng dẫn chủ yếu bao gồm: phương pháp tiếp cận vấn đề, các bước trong quá trình tìm hiểu vấn đề, các phương pháp tìm hiểu những giải pháp, các bước hoạch định, đề xuất giải pháp cho vấn đề

12.48 IT058IU - Luận văn tốt nghiệp (Thesis)

Số tín chỉ: 10 (0LT+10TH)
Điều kiện tiên quyết: Thực tập tốt nghiệp
Mô tả môn học: Đây là các đề tài có tính thực tiễn hoặc có tính khoa học cao, được thiết kế để bảo đảm sinh viên nắm và vận dụng được những kiến thức đã học trong chương trình. Sinh viên sẽ làm việc theo nhóm để thu thập yêu cầu, thiết kế, cài đặt và cung cấp giải pháp cho các vấn đề thực tế. Sinh viên có thể sử dụng mô hình thích hợp, phải tự quản lý chính đề án đố, theo các kỹ thuật quản lý đề án đã học. Kết quả của luận văn có thể là sản phẩm theo yêu cầu và các tài liệu liên quan.

12.49 IT139IU - Tính toán phân tán (Scalable and Distributed Computing)

Mã MH: IT139IU

Số tín chỉ: 4 (3,1)

Môn học trước: Không

Mô tả vắn tắt nội dung: Khóa học này trình bày lý thuyết, thiết kế, hiện thực, và phân tích các hệ thống phân bố. Thông qua các bài giảng lớp học, phòng thí nghiệm, dự án và

bài tập, sinh viên có thể học các nguyên tắc cơ bản của hệ thống phân bố, mô hình hệ thống, gọi thủ tục từ xa, các đối tượng phân bố, hỗ trợ hệ điều hành, bảo mật trong các hệ thống phân bố, các hệ thống tập tin phân bố, đồng thời, giao dịch và đồng bộ hóa, sao chép. Khóa học cũng bao gồm các chủ đề nâng cao liên quan đến công nghệ xử lý dữ liệu phân bố và đám mây: phân vùng dữ liệu, sơ đồ lưu trữ, xử lý luồng, và các thuật toán song song. Các giờ thực hành của khóa học cho phép khai thác Internet và các dịch vụ điện toán đám mây hiện đại chạy trên nhiều trung tâm dữ liệu được phân bố theo địa lý: Google, Yahoo, Facebook, iTunes, Amazon, eBay, Bing, v.v ...

12.50 IT154IU - Đại số tuyến tính (Linear algebra)

Mã MH: IT154IU

Số tín chỉ: 3 (3,0)

Môn học trước: Toán 1

Mô tả vắn tắt nội dung: Đại số tuyến tính cung cấp một khuôn khổ toán học để tổ chức thông tin và sau đó sử dụng thông tin đó để giải quyết các vấn đề, đặc biệt là các vấn đề phân tích dữ liệu. Đại số tuyến tính rất cần thiết để hiểu và tạo ra các thuật toán học máy, đặc biệt là mạng thần kinh và các mô hình học sâu.

Khóa học này sẽ cung cấp cho sinh viên kiến thức đại số tuyến tính cần thiết cho học máy và mô hình mạng thần kinh. Học sinh sẽ tìm hiểu tổng quan về ma trận cơ bản và đại số vector như được áp dụng cho các hệ thống tuyến tính. Sau đó, họ sẽ học cách thao tác ma trận để có được kiến thức hữu ích từ dữ liệu, định lượng mức độ học tập và tối ưu hóa tốc độ học tập trong không gian vector và chuyển đổi tuyến tính để khám phá dữ liệu. Các bài học và bài tập thực hành sẽ trang bị cho sinh viên nền tảng toán học cần thiết để xây dựng và đào tạo các mạng thần kinh đơn giản trong các ứng dụng khai thác dữ liệu.

12.51 PE021IU - Pháp luật đại cương

Mã MH: PE021IU

Số tín chỉ: 3 (3,0)

Môn học trước: Không

Mô tả vắn tắt nội dung:

12.52 IT159IU - Trí thông minh nhân tạo (Artificial intelligence)

Số tín chỉ : 4 (3LT + 1TH)
Môn học trước: Đại số tuyến tính , Lập trình hướng đối tượng
Mô tả môn học: Môn học nhằm cung cấp một cách tiếp cận kỹ thuật vào các khái niệm cơ bản trong lĩnh vực trí tuệ nhân tạo. Nội dung cụ thể bao gồm: lịch sử trí tuệ nhân tạo, các tác

tử, các phương pháp tìm kiếm (tìm kiếm trên không gian trạng thái, tìm kiếm có thông tin và tìm kiếm không có thông tin, tìm kiếm thỏa mãn ràng buộc hoặc tìm kiếm cho trò chơi), biểu diễn tri thức (biểu diễn tri thức cụ thể bằng logic, hệ thống lập luận bằng logic), hoạch định, và ngôn ngữ Lisp. Môn học này thích hợp cho sinh viên nào muốn có một kiến thức cơ bản vững chắc về trí tuệ nhân tạo hoặc chuẩn bị cho những phát triển sâu hơn trong lĩnh vực Trí tuệ nhân tạo.

TRƯỞNG KHOA/BỘ MÔN	**KT. HIỆU TRƯỞNG** **PHÓ HIỆU TRƯỞNG**
Nguyễn Văn Sinh	**Đinh Đức Anh Vũ**

ĐẠI HỌC QUỐC GIA
THÀNH PHỐ HỒ CHÍ MINH
TRƯỜNG ĐẠI HỌC QUỐC TẾ

CỘNG HÒA XÃ HỘI CHỦ NGHĨA VIỆT NAM
Độc lập – Tự do – Hạnh phúc

PHỤ LỤC 1

NỘI DUNG ĐIỀU CHỈNH CHƯƠNG TRÌNH ĐÀO TẠO
NGÀNH CÔNG NGHỆ THÔNG TIN KHÓA 2023 SO VỚI KHÓA 2022

(Kèm theo Quyết định số:1139/QĐ-ĐHQT ngày30tháng 8 năm 2023
của Hiệu trưởng trường Đại học Quốc tế)

1. Đối với Chuyên ngành Kỹ Thuật Mạng:

- Đối với các môn học thuộc khối kiến thức bắt buộc:

STT	Mã môn học	Tên môn học	Số tín chỉ trong CTĐT hiện nay	Số tín chỉ trong CTĐT điều chỉnh
Các môn học thêm vào (14 tín chỉ)				
1	IT134IU	Internet of Things	0	4
2	PE021IU	Pháp luật đại cương	0	3
3	IT154IU	Đại số tuyến tính	0	3
4	IT159IU	Artificial intelligence	0	4
Các môn học hủy (15 tín chỉ)				
1	CH011IU & CH012IU	Chemistry for Engineering & Chemistry Laboratory	4	0
2	PE008IU	Critical thinking	3	0
3	MA023IU	Calculus 3	4	0
4	IT131IU	Theoretical model in computing	4	0

- Đối với các môn học tự chọn.

STT	Mã môn học	Tên môn học	Số tín chỉ trong CTĐT hiện nay	Số tín chỉ trong CTĐT điều chỉnh
1	ISME105IU	Optimization and Applications	0	4
2	IT024IU	Computer Graphics	0	4
3	IT045IU	Network Design and Evaluation	0	4
4	IT068IU	Principles of Electrical Engineering I	0	3
5	IT098IU	Principles of Electrical Engineering I Laboratory	0	1
6	IT074IU	Electronics Devices	0	3

7	IT101IU	Electronics Devices Laboratory	0	1
8	IT090IU	Object-Oriented Analysis and Design	0	4
9	IT092IU	Principles of Programming Languages	0	4
10	IT103IU	Digital Signal Processing	0	4
11	IT105IU	Digital System Design	0	3
12	IT106IU	Digital System Design Laboratory	0	1
13	IT110IU	Concepts in VLSI Design	0	3
14	IT126IU	Concepts in VLSI Design Laboratory	0	1
15	IT122IU	Introduction to Wireless Network	0	4
16	IT114IU	Software Architecture	0	4
17	IT115IU	Embedded Systems	0	3
18	IT127IU	Embedded Systems Laboratory	0	1
19	IT128IU	Micro-processing Systems	0	3
20	IT129IU	Micro-processing Systems Laboratory	0	1
21	IT138IU	Data Science and Data Visualization	0	4
22	IT143IU	Big Data Technology	0	4
23	IT144IU	Business Process Analysis	0	4
24	IT145IU	Decision Support Systems	0	4
25	IT147IU	Mobile Cloud Computing	0	4
26	IT150IU	Blockchain	0	4
27	IT157IU	Deep Learning	0	4
28	IT158IU	UI Design and Evaluation	0	4
29	IT160IU	Data Mining	0	4
30	IT166IU	Software Quality Verification and Validation	0	4
31	IT167IU	Game Application Development	0	4
32	PE008IU	Critical Thinking	0	3
33	IT131IU	Theoretical Models in Computing	0	4
34	IT165IU	Security Technology and Implementation	0	4
35		Free elective	0	4

Tổng số tín chỉ chương trình đào tạo hiện nay: **151 tín chỉ**.

Tổng số tín chỉ chương trình đào tạo sau khi điều chỉnh: **150 tín chỉ**.

2. Đối với Chuyên ngành Kỹ Thuật Máy tính:

- Đối với các môn học thuộc khối kiến thức bắt buộc:

STT	Mã môn học	Tên môn học	Số tín chỉ trong CTĐT hiện nay	Số tín chỉ trong CTĐT điều chỉnh
Các môn học thêm vào (15 tín chỉ)				
1	IT134IU	Internet of Things	0	4
2	PE021IU	Pháp luật đại cương	0	3
3	IT079IU	Principles of Database Management	0	4
4	IT159IU	Artificial intelligence	0	4
Các môn học hủy (15 tín chỉ)				
1	CH011IU & CH012IU	Chemistry for Engineering & Chemistry Laboratory	4	0
2	PE008IU	Critical thinking	3	0
3	IT076IU	Software Engineering	4	0
4	IT131IU	Theoretical model in computing	4	0

- Đối với các môn học tự chọn.

STT	Mã môn học	Tên môn học	Số tín chỉ trong CTĐT hiện nay	Số tín chỉ trong CTĐT điều chỉnh
1	ISME105IU	Optimization and Applications	0	4
2	IT024IU	Computer Graphics	0	4
3	IT045IU	Network Design and Evaluation	0	4
4	IT076IU	Software Engineering	0	4
5	IT090IU	Object-Oriented Analysis and Design	0	4
6	IT092IU	Principles of Programming Languages	0	4
7	IT094IU	Information System Management	0	4
8	IT096IU	Net-Centric Programming	0	4
9	IT114IU	Software Architecture	0	4
10	IT122IU	Introduction to Wireless Network	0	4
11	IT125IU	System and Network Administration	0	4
12	IT138IU	Data Science and Visualization	0	4

13	IT139IU	Scalable and Distributed Computing	0	4
14	IT140IU	Fundamental Concepts of Data Security	0	4
15	IT143IU	Big Data Technology	0	4
16	IT144IU	Business Process Analysis	0	4
17	IT145IU	Decision Support Systems	0	4
18	IT147IU	Mobile Cloud Computing	0	4
19	IT150IU	Blockchain	0	4
20	IT156IU	Development & Operation (DevOps)	0	4
21	IT157IU	Deep Learning	0	4
22	IT158IU	UI Design and Evaluation	0	4
23	IT131IU	Theoretical Models in Computing	0	4
24	IT165IU	Security Technology and Implementation	0	4
25	IT166IU	Software Quality Verification and Validation	0	4
26	IT167IU	Game Application Development	0	4
27	PE008IU	Critical Thinking	0	3
28		Free elective	0	4

Tổng số tín chỉ chương trình đào tạo hiện nay: **150 tín chỉ**.

Tổng số tín chỉ chương trình đào tạo sau khi điều chỉnh: **150 tín chỉ**.

3. Hướng xử lý cho các sinh viên khóa cũ khi chưa học các môn học bị loại bỏ khỏi chương trình đào tạo

STT	CTĐT các năm trước 2023	Học môn thay thế
1	Calculus 3 (4 tín chỉ)	Đây là môn chung, sinh viên học chung với các chương trình khác trong trường
2	Critical thinking (3 tín chỉ)	Đây là môn chung, sinh viên học chung với các chương trình khác trong trường
4	Software engineering	01 elective (4 tín chỉ) hoặc học chung với chương trình CS vì đây là môn bắt buộc của ngành Computer science
5	Chemistry for Engineering Chemistry Laboratory (4 tín chỉ)	Đây là môn chung, sinh viên học chung với các chương trình khác trong trường

6	Theoretical model in computing	Sinh viên có thể chọn học 01 elective (4 tín chỉ) hoặc Artificial intelligence (4 tín chỉ)

ĐẠI HỌC QUỐC GIA
THÀNH PHỐ HỒ CHÍ MINH
TRƯỜNG ĐẠI HỌC QUỐC TẾ

CỘNG HÒA XÃ HỘI CHỦ NGHĨA VIỆT NAM
Độc lập – Tự do – Hạnh phúc

PHỤ LỤC 2: ĐỀ CƯƠNG CHI TIẾT CÁC MÔN HỌC

(Kèm theo Quyết định số: 1139/QĐ-ĐHQT ngày 30 tháng 8 năm 2023
của Hiệu trưởng trường Đại học Quốc tế)

Chuyên ngành Kỹ Thuật Mạng

(Sắp xếp đúng thứ tự môn học theo Bảng IE0 - Nội dung CTĐT)

Course Name: Calculus 1

Course Code: MA001IU

Course designation	This course equips students with basic concepts of calculus: limits, continuity, differentiation, and integration. Applications of these concepts are extensively discussed.
Semester(s) in which the course is taught	1, 2
Person responsible for the course	Lectures of Department of Mathematics
Language	English
Relation to curriculum	Compulsory
Teaching methods	Lectures, assignments
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: 120 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 60 (lectures) Private study including examination preparation, specified in hours[1]: 60

[1] When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.

<table>
<tr><td>Credit points</td><td>4</td></tr>
<tr><td>Required and recommended prerequisites for joining the course</td><td>None</td></tr>
<tr><td>Course objectives</td><td>1. To provide students with the main ideas and techniques of calculus. These include limits, continuity, differentiation, and integration.
2. To introduce practical applications of these ideas and techniques, through practical examples taken from many areas of engineering, business, and life sciences.
3. To develop skills in mathematical modelling and problem solving, ability to think logically, and adapt these skilss creatively to new situations</td></tr>
<tr><td>Course learning outcomes</td><td>Upon the successful completion of this course students will be able to:
<table>
<tr><th>Competency level</th><th>Course learning outcome (CLO)</th></tr>
<tr><td>Knowledge</td><td>CLO1. Have basic knowledge of limits and derivatives (Program outcomes: a)
CLO2. Have basic knowledge of definite/indefinite integrals
(Program outcomes: a)</td></tr>
<tr><td>Skill</td><td>CLO3. Can compute often used limits, can define and compute derivatives (Program outcomes: a, j)
CLO4. Can compute standard types of integrals. Use integrals in practical situations (Program outcomes: a, j)</td></tr>
<tr><td>Attitude</td><td>CLO5. Confident when dealing with derivatives and integrals. Comfortable with using derivatives and integrals in practical situations. (Program outcome: j, k)</td></tr>
</table></td></tr>
</table>

Content	*The description of the contents should clearly indicate the weighting of the content and the level.* Weight: lecture session (4 hours) Teaching levels: I (Introduce); T (Teach); U (Utilize)

Topic	**Weight**	**Level**
Functions and Graphs, Inverse Functions, Exponential Logarithmic Functions	1	I, T
Parametric Curves, Limit. One-sided Limits, Laws of Limits.	1	I, T
Evaluating Limits. The Squeeze Theorem. Continuity. The Intermediate Value Theorem	1	T, U
Tangent Lines and Velocity Problems. Rates of Change, Derivative.	1	T, U
Higher-Order Derivatives, Rules of Differentiation. Rates of Change in the Natural and Social Sciences	1	T, U
Implicit Differentiation, Differentiation of Inverse Functions,	1	T, U
Logarithmic Differentiation, Linear Approximations. Differentials.	1	T, U
Related Rates, Maxima and Minima. Critical Point, The Mean Value Theorem.	1	T, U
The First and Second Derivative Test, Concavity. Shapes of Curves, Curve Sketching	1	T, U
Indeterminate Forms and l'Hôpital's Rules, Maxima and Minima Problems, Newton's Method	1	T, U
Anti-derivatives and Indefinite Integrals, The Definite Integral	1	I, T
Properties of the Definite Integral. The Fundamental Theorem of Calculus, Integration by Substitution	1	I, T, U
Integration by Parts, Partial Fractions, Numerical Integration,	1	T, U
Improper Integrals, Areas between Curves Areas Enclosed by Parametric Curves	1	T, U
Volumes, Arc Length, Applications to Engineering, Economics and Science	1	T, U

Examination forms	Written examination

Study and examination requirements	Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. Assignments/Examination: Students must have more than 50/100 points overall to pass this course.
Reading list	J. Stewart, *Calculus*, Thomson Learning, 7th edition, 2012.

Course Name: Listening AE1

Course Code: EN008IU

1. General information

Course designation	*The course is designed to prepare students for effective listening and note-taking skills, so that they can pursue the courses in their majors without considerable difficulty. The course is therefore lecture-based in that the teaching and learning procedure is built up on lectures on a variety of topics such as business, science, and humanities.*
Semester(s) in which the course is taught	1, 2, 3
Person responsible for the course	Lecturers of Department of English
Language	English
Relation to curriculum	Compulsory
Teaching methods	Lecture, lesson
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: 90 Contact hours (lecture, exercise): 30 Private study including examination preparation, specified in hours[2]: 60
Credit points	2
Required and recommended prerequisites for joining the course	Students must fulfil ONE of the following requirements to attend this course: • hold TOEFL iBT certificate with score ≥ 61 • hold IELTS certificate with score ≥ 5.5 • complete IE2 course

[2] When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.

<table>
<tr><td>Course objectives</td><td>There are a number of objectives embedded in various teaching activities in Listening AE1 course:
Pre-listening activities: aim to activate students' current knowledge of the topic, and to provide them with lecture language and effective strategies in listening and note-taking to prepare themselves for the coming lecture. These activities include reading (this can be done before class meetings), discussing and reviewing what they have learned from the reading.
While-listening and post-listening activities: aim to enable students to put their newly activated knowledge and acquired strategies into work by taking notes on the lecture, using the outline given by the teacher or prepared by themselves. They are later on asked to assess their understanding based on their notes and discuss them with their classmates. Finally, as an optional activity, depending on time and students' needs, students are asked to summarize the lecture.
Follow-up activities: students are required to discuss the lecture topic and to prepare arguments for or against the topic in the debate. The purpose is to enhance students' comprehension of the lecture, and to allow them to put their acquired academic language into practice, and to experience the atmosphere of a university lecture class.</td></tr>
<tr><td>Course learning outcomes</td><td>Upon the successful completion of this course, students will be able to:
<table>
<tr><th>Competency level</th><th>Course learning outcome (CLO)</th></tr>
<tr><td>Knowledge</td><td>CLO1. Remember different strategies and techniques in listening to academic lectures and taking notes.
CLO2. Improve their specialized knowledge of academic lectures</td></tr>
<tr><td>Skill</td><td>CLO3. Respond to academic lectures with appropriate strategies
CLO4. Communicate effectively with their classmates and professors.</td></tr>
<tr><td>Attitude</td><td>CLO5. Respond to academic lectures with confidence</td></tr>
</table></td></tr>
</table>

<table>
<tr><td>Content</td><td>

The description of the contents should clearly indicate the weighting of the content and the level.

Weight: lecture session (2 hours)

Teaching levels: I (Introduce); T (Teach); U (Utilize)

<table>
<tr><th>Topic</th><th>Weight</th><th>Level</th></tr>
<tr><td>Orientation & Introduction of strategies and techniques in note-taking</td><td>2</td><td>I, T, U</td></tr>
<tr><td>Chapter 1: New Trends in Marketing Research</td><td>3</td><td>T, U</td></tr>
<tr><td>Chapter 2: Business Ethics</td><td>3</td><td>T, U</td></tr>
<tr><td>Chapter 3: Trends in Children’s Media Use</td><td>2</td><td>T, U</td></tr>
<tr><td>Chapter 4: The Changing Music Industry</td><td>2</td><td>T, U</td></tr>
<tr><td>Chapter 5: The Placebo Effect</td><td>2</td><td>T, U</td></tr>
<tr><td>Midterm Sample Test & Review</td><td>2</td><td>T, U</td></tr>
<tr><td>Chapter 6: Intelligent Machines</td><td>3</td><td>T, U</td></tr>
<tr><td>Chapter 7: Sibling Relationships</td><td>3</td><td>T, U</td></tr>
<tr><td>Chapter 8: Multiple Intelligences</td><td>3</td><td>T, U</td></tr>
<tr><td>Chapter 9: The Art of Graffiti</td><td>3</td><td>T, U</td></tr>
<tr><td>Final Sample Test & Review</td><td>2</td><td>T, U</td></tr>
</table>

</td></tr>
<tr><td>Examination forms</td><td>Paper and pen tests: Correct the mistakes, Fill in the blanks, Write short answers, Write a summary paragraph.</td></tr>
</table>

Study and examination requirements	*Attendance* Regular on-time attendance in this course is expected. It is compulsory that students attend atleast 80% of the course to be eligible for the final examination. *Missed tests* Students are not allowed to miss any of the tests (both on-going assessment and final test). There are very few exceptions. (Only with extremely reasonable excuses, e.g. certified paper from doctors, may students re-take the tests.) *Class behavior* Students are supposed to: prepare thoroughly for each class in accordance with the syllabus and complete allassignments upon the instructor's request participate fully and constructively in all class activities (and discussions if any) display appropriate courtesy to all involved in the class provide constructive feedback to faculty members regarding their performance
Reading list	[1] Frazie, L., & Leeming, S. (2013). *Lecture ready 3.* Oxford: Oxford University Press.References: [2] Frazie, L., & Leeming, S. (2013). *Lecture ready 1, 2.* Oxford: Oxford University Press.

2. Learning Outcomes Matrix (optional)

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO					
CLO	1	2	3	4	5	6
1						
2						
3						
4						

3. Planned learning activities and teaching methods

WEEK	P.	Chapter	Listening oriented activities	Speaking oriented activities
WEEK 1	2	ORIENTATION		
WEEK 2	2	**<u>Chapter 1</u>** **New Trends inMarketing**	Recognizing topic introducing and lectureplan presenting expressions	Expressing ideas duringa discussion

		Research	Organizing ideas by outlining	
WEEK 3	2	**<u>Chapter 2</u>** **Business Ethics**	Recognizing transition expressions Using symbols and abbreviations	Asking for clarification and elaboration during a discussion
WEEK 4	2	REVIEW		
WEEK 5	2	**<u>Chapter 3</u>** **Trends in Children's Media Use**	Recognizing generalization and support expressions	Giving opinions andasking for opinions during a discussion
WEEK 6	2	**<u>Chapter 4</u>** **The Changing MusicIndustry**	Recognizing expressions for clarification or emphasis Organizing notes byusing a split-page format	Expressing interest andasking for elaboration during a discussion
WEEK 7	2	**<u>Chapter 5</u>** **The Placebo Effect**	Recognizing cause and effect expressions Noting causes and effects	Agreeing and disagreeingduring a discussion
WEEK 8	2	SAMPLE TEST CORRECTIO N WRAP-UP AND REVIEW		
MID-TERM EXAMINATION				
WEEK 9	2	**<u>Chapter 6</u>** **Intelligent Machines**	Recognizing expressions used topredict causes and effects Using arrows to showthe relationship between causes and effects	Learning to compromiseand reach a consensus during a discussion

WEEK 10	2	REVIEW		
WEEK 11	2	**<u>Chapter 7</u>** **Sibling Relationships**	Recognizing expressions of comparison and contrast Noting comparison and contrast	Expanding on ideas during a discussion
WEEK 12	2	**<u>Chapter 8</u>** **Multiple Intelligences**	Recognizing non-verbal signals indicating important information Representing information in list form	Keeping the discussionon topic
WEEK 13	2	REVIEW		
WEEK 14	2	**<u>Chapter 9</u>** **The Art of Graffiti**	Recognizing expressions of definition Reviewing and practicing all note taking strategies	Indicating to other whenpreparing to speak or pausing to collect thoughts
WEEK 15	2	WRAP-UP AND REVIEW		
FINAL EXAMINATION				

4. Assessment plan

Assessment Type	**CLO1**	**CLO2**	**CLO3**	**CLO4**	**CLO5**
On-going assessment (30%) (participation,individual work, group work, assignments, etc.)	80% Pass	80% Pass	80% Pass	80% Pass	80% Pass
Midterm exam (30%)	80% Pass		80% Pass		
Final exam (40%)	80% Pass		80% Pass		

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics (optional)

Date revised: 15 August, 2022 **Ho Chi Minh City, 15 August 2022**

Course Name: Writing AE1

Course Code: **EN007IU**

1. General information

Course designation	*This course provides students with comprehensive instructions and practice in essay writing, including transforming ideas into different functions of writing such as process, cause-effect, comparison-contrast, and argumentative essays.*
Semester(s) in which the course is taught	1, 2, 3
Person responsible for the course	Lecturers of Department of English
Language	English
Relation to curriculum	Compulsory
Teaching methods	Lecture, lesson, project
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: 90 Contact hours (lecture, exercise): 30 Private study including examination preparation, specified in hours[3]: 60
Credit points	2
Required and recommended prerequisites for joining the course	Students must fulfil ONE of the following requirements to attend this course: • hold TOEFL iBT certificate with score ≥ 61 • hold IELTS certificate with score ≥ 5.5 • have completed IE2 course

[3] When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.

<table>
<tr><td>Course objectives</td><td>Throughout the whole course, students are required to read university-level texts to develop the ability to read critically and to respond accurately, coherently and academically in writing. Through providing them with crucial writing skills such as brainstorming, paraphrasing, idea developing, revising, and editing, this course prepares the students for research paper writing in the next level of AE2 writing.</td></tr>
<tr><td>Course learning outcomes</td><td>Upon the successful completion of this course, students will be able to:
<table>
<tr><th>Competency level</th><th>Course learning outcome (CLO)</th></tr>
<tr><td>Knowledge</td><td>CLO1. Understand and follow different steps in the writing process to produce a complete essay
CLO2. Employ different methods to improve their writing such as peer feedback and teacher comments</td></tr>
<tr><td>Skill</td><td>CLO3. Read critically, analyze and annotate an academic text
CLO4. Use different functions of writing to successfully communicate their purposes to the audience (describe a process, discuss the causes and effects, compare and contrast, make arguments, paraphrase and summarize)</td></tr>
<tr><td>Attitude</td><td>CLO5. Reason around ethical issues in writing academic essays and avoid committing plagiarism</td></tr>
</table></td></tr>
</table>

<table>
<tr><td>Content</td><td>

The description of the contents should clearly indicate the weighting of the content and the level.

Weight: lecture session (2 hours)

Teaching levels: I (Introduce); T (Teach); U (Utilize)

<table>
<tr><th>Topic</th><th>Weight</th><th>Level</th></tr>
<tr><td>The process of Academic Writing</td><td>1</td><td>I, T, U</td></tr>
<tr><td>Using Outside Sources</td><td>3</td><td>T, U</td></tr>
<tr><td>From Paragraph to Essay</td><td>4</td><td>T, U</td></tr>
<tr><td>Process Essays</td><td>4</td><td>T, U</td></tr>
<tr><td>Cause/Effect Essays</td><td>4</td><td>T, U</td></tr>
<tr><td>Comparison/ Contrast Essays</td><td>4</td><td>T, U</td></tr>
<tr><td>Argumentative Essays</td><td>6</td><td>T, U</td></tr>
<tr><td>Summarizing</td><td>2</td><td>U</td></tr>
<tr><td>Review & Correction</td><td>2</td><td>U</td></tr>
</table>

</td></tr>
<tr><td>Examination forms</td><td>Essay writing</td></tr>
<tr><td>Study and examination requirements</td><td>

Attendance

Regular on-time attendance in this course is expected. A student will be allowed no more than three absences. It is compulsory that the students attend at least 80% of the course to be eligible for the final examination.

Missed Tests

Students are not allowed to miss any of the tests (both Mid-term and Final). There are very few exceptions. Only with extremely reasonable excuses (eg. certified paper from doctors), students may re-take the examination.

Class Behaviors

Students are required to treat their studying in college as a full-time job and spend an adequate amount of time for this Writing AE1 course with approximately 8-10 hours per week (both in class and self-study). Accordingly, students are supposed to follow the obligations below:

</td></tr>
</table>

	- Prepare thoroughly for each class in accordance with the course syllabus and complete home assignments as the instructor's request. - Participate fully and constructively in all course activities and discussions (if any). - Display appropriate courtesy to all involved in the class. - Provide constructive feedback to faculty members regarding their performance. *Plagiarism* Students are warned not to copy from other books or from their peers for all assessment tasks. Committing plagiarism will result in 0 point for the task. Students who plagiarize twice will be prohibited from sitting the final examination. *Writing Center (Room 509)* Students are encouraged to visit the Writing Center to schedule an appointment for additional help with essay writing.
Reading list	[1] Oshima, A., & Hogue, A. (2017). *Longman Academic Writing Series, Level 4: Essays* (5th ed.).New Jersey, NJ: Pearson Longman. [2] Oshima, A., & Hogue, A. (2006). *Longman Academic Writing Series, Level 4: Essays* (4th ed.).New Jersey, NJ: Pearson Longman.

2. Learning Outcomes Matrix (optional)

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO					
CLO	1	2	3	4	5	6
1						
2						
3						
4						

3. Planned learning activities and teaching methods

Week	Coursebook		Homework
	Chapter	***Pages***	
1	**The process of AcademicWriting** Step 1: Creating (Prewriting) Step 2: Planning (Outlining)Step 3: Writing Step 4: Polishing ***Using Outside Sources*** Paraphrasing Plagiarism and how to	[2] pp. 265-279 [1] pp. 58-65	• Do revising & editing exercises • Read pp. [1] pp. 66-72
2	***Using Outside Sources (Cont'd)*** Strategies for writing a successfulsummary	[1] pp. 58 - 72	• Do paraphrasing exercises • Read [1] pp.74-100. Read, take notes and write the summary of ONE of the following articles: ○ The Challenge of ManyLanguages (p. 280) ○ Nice by Nature? (p. 281) ○ Marital Exchanges (pp. 283-4) ○ Why We Should Send a Manned Mission to Mars (pp.286-7) ○ Let's Not Go to Mars (pp. 288-9)
3 & 4	**Review/ Correction**: Lecturer gives feedback to one or two students' writings in class. **From Paragraph to Essay** The introductory paragraph: • General statements & Introductory techniques • Thesis statements & Logicaldivision of ideas Body paragraphs: • Topic sentences The concluding paragraph: • Restatement • Final thoughtsOutlines of essays	[1] pp. 74 – 100	• Read pp. 101-15 • Do exercises on: ○ Writing thesis statements ○ Writing topic sentences fromthe thesis statement provided ○ Writing restatements

5	**Process Essays** Introduction Analyzing the models Thesis statements for process essays Transitional signals **Write together:** Writing from a diagram (p.115)	[1] pp. 101 - 115	• Write a short essay (150-200words) describing how hydroelectric power is generated (or a topic of the lecturer's choice)
6	**Process Essays (Cont'd)** **Review/ Correction**: Lecturer gives feedback to one or two students' writings in class. ***<u>In-class Assignment:</u>*** Write a process essay about one of these topics or a topic of the lecturer's choice: • How to cook a favorite food • How to do a favorite hobby • How to succeed in your major area or professional field • How to accomplish an academic task (register for classes, apply for a scholarship, pass an exam, etc.)	[1] pp. 101 - 115	• Read [1] pp. 116-132
7	**Cause/ Effect Essays**Introduction Analyzing the modelsOrganization Signal words and phrases **Write together:** Write the introduction, ONE bodyparagraph and the conclusion on one of the topics below or a topic of the lecturer's choice: • The cause of obesity • The effects of involvement in sports on young children • The causes of stress in collegestudents • The effects of regular reading on students' lives	[1] pp. 116 - 132	• Practice 4, 5,6 /pp. 127-9 • Write the introduction, ONE body paragraph and the conclusion on one of the topics below or a topic of the lecturer's choice. The topic should be different from the one that has been used in class: o The cause of obesity o The effects of involvement insports on young children o The causes of stress in college students o The effects of regular readingon students' lives

8	**Cause/ Effect Essays (Cont'd)Review/ Correction:** Lecturer gives feedback to one or two students' writings in class. ***<u>In-class Writing:</u>*** Write the introduction, ONE bodyparagraph and the conclusion on one of the two topics left (except for the ones that has been worked on in class and assigned as homework) or a topic of the lecturer's choice: • The cause of obesity • The effects of involvement insports on young children • The causes of stress in collegestudents The effects of regular reading on students' lives		• Give peer-feedback using therubric provided
MID-TERM EXAMINATION			
9	**Comparison/ Contrast Essays** Introduction Analyzing the modelsOrganization: • Points of comparison • Point-by-point organization • Block organization Comparison and Contrast signalwords **Write together:**	[1] pp. 133 - 151	• Practice 3, 4, 6, 7/pp.142-6 • Write the introduction, ONE body paragraph and the conclusion on one of the topics below or a topic of the lecturer's choice. The topic should be different from the one that has been used in class: o Compare and contrast the

	Write the introduction, ONE bodyparagraph and the conclusion on one of the topics below or a topic of the lecturer's choice: • Compare and contrast the relationship between parents and children in two different cultures. • Compare and contrast theuniversity culture in two different countries. • Compare and contrast the culture of a small town and a big city.		relationship between parents and children in two differentcultures. ○ Compare and contrast theuniversity culture in two different countries. ○ Compare and contrast the culture of a small town and abig city.
10	**Comparison/ Contrast Essays(Cont'd)** **Review/ Correction:** Lecturergives feedback to one or two students' writings in class. ***<u>In-class Assignment:</u>*** Write a compare and contrast essay on the topic left or a topic ofthe lecturer's choice: • Compare and contrast the relationship between parents and children in two different cultures • Compare and contrast theuniversity cultures in two different countries • Compare and contrast the cultures of a small town and a big city	[1] pp. 133 - 151	• Read [1] pp. 152-168
11 & 12	**Argumentative Essays** Introduction Analyzing the model	[1] pp. 152-168	• Write an argumentative essay (300 – 350 words) on ONE of the following topics or a topic

	Organization: Block vs. Point-by-point pattern The elements of an argumentativeessay: • An explanation of the issue • A clear thesis statement • A summary of the opposingarguments • Rebuttals to the opposingarguments • Your own arguments The introductory paragraph: Thesis Statement Statistics as support **Write together:** Write the introduction, ONE bodyparagraph and the conclusion on one of the topics below or a topic of the lecturer's choice: • Can same-sex parentingnegatively influence a child's mentality? • Do famous artists have aninnate talent, or do they put in great effort to improve their skills? • Is homework helpful?		of the lecturer's choice: ○ Can same-sex parenting negatively influence a child'smentality? ○ Do famous artists have an innate talent, or do they put ingreat effort to improve their skills? ○ Is homework helpful?
13	**Argumentative Essays (Cont'd)Review/ Correction:** Lecturer gives feedback to one or two students' writings in class. **In-class Writing:** Write an argumentative essay onthe topic left or a topic of the lecturer's choice: • Can same-sex parenting negatively influence achild's mentality? • Do famous artists have aninnate talent, or do they put in great effort to improve their skills? • Is homework helpful?		• Give peer-feedback using therubric provided

14	Review & Practice: Summarizing		Sample final test
15	**Review/Correction:** Lecturer gives feedback to one or two students' argumentative essays +sample final test in class. Lecturer has students check their own assignment scores.		
FINAL EXAMINATION			

Course Name: Introduction to Computing
Course Code: IT064

1. General information

Course designation	This course introduces students to a broad knowledge of the computer science and information technology fields. Topics covered will include basic computer concepts, components of computer hardware and operating systems software as well as data and telecommunications systems. Students can use the knowledge they've gained to strengthen their future-oriented job.
Semester(s) in which the course is taught	1,3
Person responsible for the course	Dr. Nguyen Trung Ky
Language	English
Relation to curriculum	Compulsory
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	Total workload: 135 hours. Contact hours: 45 hours (lecture). Private study including examination preparation, specified in hours: 90 hours.
Credit points	Number of credits: 3 Lecture: 3 Laboratory: 0
Required and recommended prerequisites for joining the course	None
Course objectives	This course is to provide fundamentals and basic concepts of computer science and engineering, basics of Computing such as basic concepts, models, trends in industry. Introduction to majors and curricula, career path of all majors in computing, career orientation, job requirements and career opportunities in industry are also included in this course.
Course learning outcomes	

Competency level	**Course learning outcome (CLO)**
Knowledge	CLO1, CLO2.
Skill	CLO3, CLO4.
Attitude	CLO5.

<table>
<tr><td>Content</td><td>The description of the contents should clearly indicate the weighting of the content and the level.
Weight: lecture session (3 hours)
Teaching levels: I (Introduce); T (Teach); U (Utilize)
<table>
<tr><th>Topic</th><th>Weight</th><th>Level</th></tr>
<tr><td>The Overall Picture</td><td>1</td><td>I</td></tr>
<tr><td>Data and Information</td><td>2</td><td>T, U</td></tr>
<tr><td>Hardware</td><td>2</td><td>T, U</td></tr>
<tr><td>Algorithm and Programming Language</td><td>2</td><td>T, U</td></tr>
<tr><td>Operating System</td><td>2</td><td>T, U</td></tr>
<tr><td>Networking</td><td>2</td><td>T, U</td></tr>
<tr><td>Information System and Application</td><td>2</td><td>T, U</td></tr>
<tr><td>Majors and Curriculum, Career Paths and Orientation Careers at a Hardware, Network and Software Company</td><td>1</td><td>I</td></tr>
<tr><td>Revision</td><td>1</td><td></td></tr>
</table></td></tr>
<tr><td>Examination forms</td><td>Multiple-choice questions, short-answer questions</td></tr>
<tr><td>Study and examination requirements</td><td>Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.
Assignments/Examination: Students must have more than 50/100 points overall to pass this course.</td></tr>
<tr><td>Reading list</td><td>[1] Nell Dale and John Lewis, “Computer science: Illuminated”, 7th Edition, Jones & Bartlett Learning Publisher, ISBN-13 978-1284155617, 2019.
[2] J. Glenn Brookshear, “Computer Science: An Overview”, 12th Edition, Pearson Publisher, ISBN-13 978-0133760064, 2014.
[3] Peter Wentworth, Jeffrey Elkner, "How to Think Like a Computer Scientist: Learning with Python 3 Documentation", 3rd Edition, Allen B. Downey and Chris Meyers, Green Tea Press Publisher, ISBN-13 978-0971677500, 2020.</td></tr>
</table>

2. **Learning Outcomes Matrix**

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO					
CLO	1	2	3	4	5	6

1	X			X		
2	X			X		
3	X					
4	X					
5					X	

3. **Planned learning activities and teaching methods**

Week	**Topic**	**CLO**	**Assessments**	**Learning activities**	**Resources**
1	The Overall Picture	1		Lecture, Discussion	[1]. Chapter 1
2	Binary Values and Number System	1, 2	Quiz.	Lecture, In-class quiz	[1]. Chapter 2
3	Data Representation	1, 2	Quiz	Lecture, In-class quiz	[1]. Chapter 3
4	Gates and Circuits	1, 2	Quiz	Lecture, In-class quiz	[1]. Chapter 4
5	Computing Components	1, 2	Quiz	Lecture, In-class quiz	[1]. Chapter 5
6	Low-level Programming Languages and Pseudocode	1, 2	Quiz	Lecture, In-class quiz	[1]. Chapter 6
7	**Midterm**				
8	Problem Solving and Algorithm, Abstract Data Types and Subprograms	1, 2	Quiz	Lecture, In-class quiz	[1]. Chapter 7,8
9	Object-oriented Design and High-level Programming Languages	1, 2	Quiz	Lecture, In-class quiz	[1]. Chapter 9
10	Operating System and File System and Directory	1, 2	Quiz	Lecture, In-class quiz	[1]. Chapter 10, 11
11	Information System, Artificial Intelligence	1, 2	Quiz	Lecture, In-class quiz	[1]. Chapter 12, 13
12	Simulation, Graphics, Gaming, and Other Programming Networks	1, 2	Quiz	Lecture, In-class quiz	[1]. Chapter 14, 15
13	The World Wide Web Computer Security	1, 2	Quiz	Lecture, In-class quiz	[1]. Chapter 16, 17

14	Majors and Curriculum, Career Paths and Orientation, Careers at Hardware, Network and Software Company	3, 4		Lecture, Discussion	
15	Revision			Review-test	
16	**Final exam**				

4. **Assessment plan**

Assessment Type	**CLO 1**	**CLO 2**	**CLO 3**	**CLO 4**	**CLO 5**
Quiz (10%)	25%	25%	33.3 %	33.3 %	25%
Midterm examination (30%)	25%	25%			25%
Projects/Presentations/ Report (20%)	25%	25%	33.3 %	33.3 %	25%
Final examination (40%)	25%	25%	33.3 %	33.3 %	25%

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

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1. When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.↩

5. Rubrics (optional)

5.1. Grading checklist

Grading checklist for Written Reports			
Student: …… HW/Assignment: ……. Date: …… Evaluator: ……			
	Max.	**Score**	**Comments**
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		

Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)	10		
TOTAL SCORE	100		

5.2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	**Description**
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	Issue/ problem to be considered critically is stated without clarification or description.

Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation/ evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.

	(perspective, thesis/ hypothesis).			
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.

Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandabilit y of the presentation, and speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/

	presenter's credibility/ authority on the topic.	authority on the topic.	authority on the topic.	authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022

Dean of School of Computer Science and Engineering

Assoc.Prof. Nguyen Van Sinh

Course Name: C/C++ Programming

Course Code: IT116

1. General information

Course designation	Learning the basics of programming
Semester(s) in which the course is taught	2
Person responsible for the course	MSc. Le Thanh Son
Language	English
Relation to curriculum	Compulsory (CS, NE, CE)
Teaching methods	Lecture
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: 195 Contact hours: 45 (lecture) + 30 (laboratory) Private study including examination preparation, specified in hours: 120
Credit points	Number of credits: 4 Lecture: 3 Laboratory: 1
Required and recommended prerequisites for joining the course	None
Course objectives	This course concentrates on learning the basics of programming languages which are the foundations for further studies in IT. The course enables students to get familiar with C programming language. The course covers all basic C data structures, control flows, simple data structures as well as other advanced topics which include pointers, bit operators, file processing, dynamic data types.
Course learning outcomes	CLO 1. Understand programming languages and applications, how applications work CLO 2. Understand basic data structure and control flow of C programming language CLO 3. Able to write applications using C

Competency level	**Course learning outcome (CLO)**
Knowledge	1
Skill	2, 3
Attitude	

<table>
<tr><td>Content</td><td>The description of the contents should clearly indicate the weighting of the content and the level.
Weight: lecture session (3 hours)
Teaching levels: I (Introduce); T (Teach); U (Utilize)
<table>
<tr><th>Topic</th><th>Weight</th><th>Level</th></tr>
<tr><td>Introduction to Computer and Programming Language</td><td>1</td><td>I</td></tr>
<tr><td>Introduction to C Programming Language</td><td>1</td><td>I, T</td></tr>
<tr><td>C Basic Data Types</td><td>1</td><td>T, U</td></tr>
<tr><td>Control Flow: Branching statements</td><td>1</td><td>T, U</td></tr>
<tr><td>Control Flow: Iteration</td><td>1</td><td>T, U</td></tr>
<tr><td>Functions</td><td>1</td><td>T, U</td></tr>
<tr><td>Array</td><td>1</td><td>T, U</td></tr>
<tr><td>Pointers</td><td>1</td><td>T, U</td></tr>
<tr><td>String</td><td>1</td><td>T, U</td></tr>
<tr><td>File Processing</td><td>1</td><td>T, U</td></tr>
<tr><td>Dynamic Memory Allocation</td><td>1</td><td>T, U</td></tr>
<tr><td>Struct, Union</td><td>1</td><td>T, U</td></tr>
<tr><td>Bitwise Operation</td><td>1</td><td>T, U</td></tr>
<tr><td>Linked list, Stack, Queue</td><td>1</td><td>T, U</td></tr>
<tr><td>Binary tree</td><td>1</td><td>T, U</td></tr>
</table></td></tr>
<tr><td>Examination forms</td><td>Short-answer questions, Programming exercises</td></tr>
<tr><td>Study and examination requirements</td><td>Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.
Assignments/Examination: Students must have more than 50/100 points overall to pass this course.</td></tr>
<tr><td>Reading list</td><td>1. Paul Deitel, C How to Program 8th, 2016</td></tr>
</table>

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

CLO\SLOT	1	2	3	4	5	6
1	x					
2		xxx				
3		xxx				

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
1	Introduction to Computer and Programming Language	1	Quiz	Lecture	1
2	Introduction to C Programming Language	1	Quiz	Lecture	1
3	C Basic Data Types	1	Quiz	Lecture	1
4	Control Flow: Branching statements	2, 3	Quiz, Lab, Midterm	Lecture, Discussion, In-class Exercise	1
5	Control Flow: Iteration	2, 3	Quiz, Lab, Midterm	Lecture, Discussion, In-class Exercise	1
6	Functions	2, 3	Quiz, Lab, Midterm	Lecture, Discussion, In-class Exercise	1
7	Array	2, 3	Quiz, Lab, Midterm	Lecture, Discussion, In-class Exercise	1
8	Pointers	2, 3	Quiz, Lab, Midterm	Lecture, Discussion, In-class Exercise	1
Midterm					
9	String	2, 3	Quiz, Lab, Final	Lecture, Discussion, In-class Exercise	1
10	File Processing	2, 3	Quiz, Lab, Final	Lecture, Discussion, In-class Exercise	1
11	Dynamic Memory Allocation	2, 3	Quiz, Lab, Final	Lecture, Discussion, In-class Exercise	1
12	Struct, Union	2, 3	Quiz, Lab, Final	Lecture, Discussion	1

				, In-class Exercise	
13	Bitwise Operation	2, 3	Quiz, Lab, Final	Lecture, Discussion , In-class Exercise	1
14	Linked list, Stack, Queue	2, 3	Quiz, Lab, Final	Lecture, Discussion , In-class Exercise	1
15	Binary tree	2, 3	Quiz, Lab, Final	Lecture, Discussion , In-class Exercise	1
Final					

4. Assessment plan

Assessment Type	**CLO1**	**CLO2**	**CLO3**
Quiz / Assigment (10%)	50%	10%	10%
Labs (20%)	10%	30%	30%
Midterm examination (30%)	30%	30%	30%
Final examination (40%)	10%	30%	30%

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

1. Rubrics (optional)

5.1. Grading checklist

Grading checklist for Written Reports			
Student: …… HW/Assignment: ……. Date: …… Evaluator: ……			
	Max.	**Score**	**Comments**
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			

Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)	10		
TOTAL SCORE	100		

5.2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	**Description**
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	Issue/ problem to be considered critically is stated without clarification or description.

Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation/ evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.

	(perspective, thesis/ hypothesis).			
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.

Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/

	presenter's credibility/ authority on the topic.	authority on the topic.	authority on the topic.	authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022

Dean of School of Computer Science and Engineering

Assoc.Prof. Nguyen Van Sinh

Course Name: Object-Oriented Programming

Course Code: IT069IU

1. General information

Course designation	This subject introduces students to the object-oriented programming from basic notions to professional principles for designing an object-oriented software.
Semester(s) in which the course is taught	3
Person responsible for the course	Dr. Tran Thanh Tung
Language	English
Relation to curriculum	Compulsory (all programs)
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	Total workload: 195 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 45 (lecture) + 30 (laboratory) Private study including examination preparation, specified in hours: 120
Credit points	Number of credits: 4 Lecture: 3 Laboratory: 1
Required and recommended prerequisites for joining the course	Prerequisite course of OOP: C/C++ Programming
Course objectives	Introduction to object-oriented programming and design. Topics include core terminologies and basic design principles of object-oriented programming such as classes, objects, abstraction, encapsulation, inheritance, polymorphism, the SOLID design principles, and design patterns
Course learning outcomes	CLO 1. Explain and use concepts in object-oriented programming including classes, objects, abstraction, encapsulation, inheritance, and polymorphism. CLO 2. Implement an object-oriented solution in JAVA programming language. CLO 3. Analyze design principles and design patterns in object-oriented programing

Competency level	**Course learning outcome (CLO)**
Knowledge	CLO1
Skill	CLO2, **CLO3**

		Attitude		

Content

The description of the contents should clearly indicate the weighting of the content and the level.
Weight: lecture session (~~3~~ hours)
Teaching levels: I (Introduce); T (Teach); U (Utilize)

Topic	**Weight**	**Level**
Introduction to Java	3	I
Introduction to Object-Oriented Programming	3	I, T
Classes and Objects	3	T
Inheritance and composition	3	T
Polymorphism	3	T
Design with interfaces and abstract classes	3	T
Building Objects	3	T
Exception handling	3	T
Generic classes and methods	3	T
Introduction to SOLID principles Single responsibility principle	3	T, U
Open/closed principle	1.5	T, U
Lisko substitution principle	1.5	T, U
Interface segregation principle	1.5	T, U
Dependency inversion principle	1.5	T, U
Reusing Designs Through Design Patterns	6	T, U

Examination forms

Short-answer questions

Study and examination requirements

Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.
Assignments/Examination: Students must have more than 50/100 points overall to pass this course.

Reading list

1. Paul J. Deitel (Author), Harvey Deitel (Author), Java How To Program, 11th Edition, Prentice Hall, 2017
2. Matt Weisfeld, The Object-Oriented Thought Process, 3rd Edition, Addison-Wesley, 2009
3. Erich Gamma, Richard Helm, Ralph Johnson and John Vlissides, Design Patterns: Elements of Reusable Object-Oriented Software, Addison-Wesley Professional, 1994
4. Eric Freeman, Bert Bates, Kathy Sierra and Elisabeth Robson, Head First Design Patterns: A Brain-Friendly Guide, O'Reilly Media, 2004

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO					
CLO	1	2	3	4	5	6
1	XX					
2		XX				X
3		XXX				X

3. Planned learning activities and teaching methods

Week	**Topic**	**CLO**	**Assessments**	**Learning activities**	**Resources**
1	Introduction to Java	1	Quiz	Lecture	[1]
2	Introduction to Object-Oriented Programming	1	Quiz	Lecture, Discussion	[1,2]
3	Classes and Objects	2	Quiz, Lab, Midterm	Lecture, Discussion, In-class exercises	[1,2]
4	Inheritance and composition	2	Quiz, Lab, Midterm	Lecture, Discussion, In-class exercises	[1,2]
5	Polymorphism	2	Quiz, Lab, Midterm	Lecture, Discussion, In-class exercises	[1,2]
6	Design with interfaces and abstract classes	2,3	Quiz, Lab, Midterm	Lecture, Discussion, In-class exercises	[1,2]
7	Building Objects	2,3	Quiz, Lab, Midterm	Lecture, Discussion, In-class exercises	[1,2]
8	Exception handling	1,2	Quiz	Lecture	[1]
9	**Midterm**				
10	Generic classes and methods	2,3	Quiz, Lab, Final	Lecture, Discussion, In-class exercises	[1,2]

11	Introduction to SOLID principles Single responsibility principle	2,3	Quiz, Project, Final	Lecture, Discussion, In-class exercises	[1,3,4]
12	Open/closed principle Lisko substitution principle	2,3	Quiz, Project, Final	Lecture, Discussion, In-class exercises	[1,3,4]
13	Interface segregation principle Dependency inversion principle	2,3	Quiz, Project, Final	Lecture, Discussion, In-class exercises	[1,3,4]
14	Reusing Designs Through Design Patterns, part 1	2,3	Quiz, Project, Final	Lecture, Discussion, In-class exercises	[1,3,4]
15	Reusing Designs Through Design Patterns, part 2	2,3	Quiz, Project, Final	Lecture, Discussion, In-class exercises	[1,3,4]
16	**Final exam**				

4. Assessment plan

Assessment Type	**CLO1**	**CLO2**	**CLO3**
Quiz (5%)	10%		20%
Labs (10%)	30%	30%	
Midterm examination (30%)	50%	40%	
Projects/Presentations/ Report (15%)	10%		30%
Final examination (40%)		30%	50%

5. Rubrics (optional)

5.1. Grading checklist

Grading checklist for Written Reports			
Student: …….. Date: ……	HW/Assignment: ……. Evaluator: ……		
	Max.	**Score**	**Comments**
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		

Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)	10		
TOTAL SCORE	100		

5.2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	**Description**
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously	Issue/ problem to be considered critically is stated but description leaves some terms	Issue/ problem to be considered critically is stated without clarification or description.

	necessary for full understanding.	impeded by omissions.	undefined, ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	
Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation / evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.

Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**

Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.

Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022

Dean of School of Computer Science and Engineering

Assoc.Prof. Nguyen Van Sinh

Course Name: Discrete Mathematics

Course Code: IT153

1. **General information**

Course designation	The course provides students the ability to reason and think mathematically and logically; and apply this ability to analyze and solve discrete practical problems in Computer Science and IT.
Semester(s) in which the course is taught	4
Person responsible for the course	Assoc. Prof. Nguyen Van Sinh
Language	English
Relation to curriculum	Compulsory (NE, CE, CS)
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	Total workload: 135 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 45 (lecture) Private study including examination preparation, specified in hours: 90
Credit points	Number of credits : 3 Lecture: 3 Laboratory: 0
Required and recommended prerequisites for joining the course	C/C++ Programming Calculus 1, 2
Course objectives	This course provides students the based knowledge of discrete mathematics. To develop the ability to reason and think mathematically and logically; and to apply this ability to analyzing and solving discrete practical problems in computer science. This is an application-oriented course based upon the study of events that occur in small, or discrete in computer science, segments in business, industry, government and the digital areas. Students will be introduced to the mathematical tools of logic and set theory, counting, number theory, and graph theory. Practical applications will be introduced throughout the course
Course learning outcomes	CLO 1. Understand and apply count/enumerate objects in a systematic way. CLO 2. Understand mathematical reasoning in order to read, comprehend and construct mathematical arguments; Understand to work with discrete structures and practical problems in computer science and IT

CLO 3. Apply algorithm thinking and modeling; Apply knowledge in computer science for problems solving
CLO 4. Have a sense of preparation of good mathematical knowledges to approach and solve problems in computer science and information technology.

Competency level	**Course learning outcome (CLO)**
Knowledge	CLO1, CLO2
Skill	CLO2, CLO3
Attitude	CLO4

Content

The description of the contents should clearly indicate the weighting of the content and the level.
Weight: lecture session (3 teaching hours)
Teaching levels: I (Introduce); T (Teach); U (Utilize)

Topic	**Weight**	**Level**
Week 1: Course syllabus and introduction; Logic and propositions	3	I,T
Week 2: Logic and propositions (continue)	3	I,T,U
Week 3: Propositional Equivalences; predicates and quantifiers	3	I,T,U
Week 4: Nested Quantifiers and Methods of Proof	3	I,T,U
Week 5: Induction and recursion	3	I,T,U
Week 6&7: Number of theory	3	I,T,U
Week 8: Counting: part 1, 2; midterm review	3	I,T,U
Week 9: Counting: part 3	3	I,T,U
Week 10: Advanced counting	3	I,T,U
Week 11: Boolean algebras	3	I,T,U
Week 12: Graph theory	3	I,T,U
Week 13: Optimal problem solving on graphs	3	I,T,U
Week 14: Introduction and application of tree	3	I,T,U
Week 15: Search on tree; review for final exam	3	I,T,U

Examination forms

Multiple-choice questions, short-answer questions

Study and examination requirements

Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.

	Assignments/Examination: Students must have more than 50/100 points overall to pass this course.
Reading list	1. Kenneth H. Rosen, Discrete Mathematics and Its Applications 8th edition, 2019. 2. Oscar Levin, Discrete mathematics An Open Introduction. 3rd edition, 2019. 3. Vietnamese book: N.V.Sinh, T.M.Hà, N.T.T.Sang, N.M.Quân, "Nền tảng Toán học trong Công nghệ Thông tin", NXB - Đại học Quốc gia TPHCM, ISBN: 978-604-73-6518-0, 2018.

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO					
CLO	1	2	3	4	5	6
1	X	X				
2	X	X				
3		X				
4						X

3. Planned learning activities and teaching methods

Week	**Topic**	**CLO**	**Assessments**	**Learning activities**	**Resources**
1	Course syllabus and introduction; Logic and propositions	1,2	Questions and answers	Lecture, Discussion, In-class exercises	[1, 2]
2	Logic and propositions (continue)	2,3,4	Quiz, Homework, Midterm exam	Lecture, Discussion, In-class exercises	[1, 2]
3	Propositional Equivalences; predicates and quantifiers	2,3,4	Quiz, Homework, Midterm exam	Lecture, Discussion, In-class exercises	[1, 2]
4	Nested Quantifiers and Methods of Proof	2,3,4	Quiz, Homework, Midterm exam	Lecture, Discussion, In-class exercises	[1, 2]
5	Induction and recursion	2,3,4	Quiz, Homework, Midterm exam	Lecture, Discussion,	[1, 2]

				In-class exercises	
6	Number of theory	2,3,4	Quiz, Homework, Midterm exam	Lecture, Discussion, In-class exercises	[1, 2]
7	Number of theory (continue)	2,3,4	Quiz, Homework, Midterm exam	Lecture, Discussion, In-class exercises	[1, 2]
8	Counting: part 1, 2; midterm review	2,3,4	Quiz, Homework, Midterm exam	Lecture, Discussion, In-class exercises	[1, 2, 3]
	Midterm examination				
9	Counting: part 3	2,3,4	Quiz, Homework, Final exam	Lecture, Discussion, In-class exercises	[1, 2]
10	Advanced counting	2,3,4	Quiz, Homework, Final exam	Lecture, Discussion, In-class exercises	[1, 2]
11	Boolean algebras	2,3,4	Quiz, Homework, Final exam	Lecture, Discussion, In-class exercises	[1, 2, 3]
12	Graph theory	2,3,4	Quiz, Homework, Final exam	Lecture, Discussion, In-class exercises	[1, 2, 3]
13	Optimal problem solving on graphs	2,3,4	Quiz, Homework, Final exam	Lecture, Discussion, In-class exercises	[1, 2, 3]
14	Introduction and application of tree	2,3,4	Quiz, Homework, Final exam	Lecture, Discussion, In-class exercises	[1, 2, 3]
15	Search on tree; review for final exam	2,3,4	Quiz, Homework, Final exam	Lecture, Discussion, In-class exercises	[1, 2, 3]
1	**Final examination**				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
Quiz/Homework/Assignment (25%)	20%	30%	30%	20%
Midterm examination (30%)	25%	25%	25%	25%
Final examination (45%)		30%	40%	30%

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics (optional)

5.1. Grading checklist

Grading checklist for Written Reports			
Student: …….. Date: ……	HW/Assignment: ……. Evaluator: ……		
	Max.	**Score**	**Comments**
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)	10		
TOTAL SCORE	100		

5.2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	**Description**
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.

3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	Issue/ problem to be considered critically is stated without clarification or description.
Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation / evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact,	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.

			with little questioning.	
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.

Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the	Language choices are thoughtful and generally support the effectiveness of the presentation.	Language choices are mundane and commonplace and partially support the effectiveness of the	Language choices are unclear and minimally support the effectiveness of the presentation. Language in

	effectiveness of the presentation. Language in presentation is appropriate to audience.	Language in presentation is appropriate to audience.	presentation. Language in presentation is appropriate to audience.	presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.

Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022

Dean of School of Computer Science and Engineering

Assoc.Prof. Nguyen Van Sinh

Course Name: Physics 1

Course Code: PH013IU

1. General information

Course designation	*This subject will provide an introduction to mechanics including: concepts and principles of kinetics, dynamics, energetics of motion of a particle and a rigid body.*
Semester(s) in which the course is taught	1, 2
Person responsible for the course	Assoc. Prof. Phan Bảo Ngọc Dr. Phan Hiền Vũ
Language	English
Relation to curriculum	Compulsory
Teaching methods	Lecture, lesson, assignment.
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: 90 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): lecture: 30 Private study including examination preparation, specified in hours[4]: 60
Credit points	2
Required and recommended prerequisites for joining the course	None

[4] When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.

Course objectives	This course will provide students with: 2. The basic knowledge of general Mechanics Physics 3. Skills to solve problems in engineering environment by applying both theoretical and experimental techniques 4. Understanding and skills needed to use physical laws governing real process and to solve them in the engineering environment 5. Confidence and fluency in discussing physics in English.
Course learning outcomes	Upon the successful completion of this course students will be able to:

Competency level	**Course learning outcome (CLO)**
Knowledge	CLO1. An ability to understand of basic knowledge of law of conservations and dynamics of rigid body. CLO2. An ability to analysis and design a problem in science and engineering
Skill	CLO3. An ability in applying knowledge of physics
Attitude	CLO4. An ability to communicate effectively in writing manner

Content

The description of the contents should clearly indicate the weighting of the content and the level.

Weight: lecture session (2 hours)

Teaching levels: I (Introduce); T (Teach); U (Utilize)

Topic	**Weight**	**Level**
Chapter 1: Bases of Kinematics	2	I, T
Chapter 2: The Law of Motion	2	I, T
Chapter 3: Work and Mechanical Energy	3	I, T
Chapter 4: Linear Momentum and Collisions	2	I, T
Chapter 5: Rotation of a Rigid Object About a Fixed Axis	2	I, T
Chapter 6: Equilibrium and Elasticity	2	I, T
Chapter 7: Universal Gravitation	2	I, T

Examination forms	Short-answer questions

Study and examination requirements	Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. Assignments/Examination: Students must have more than 50/100 points overall to pass this course.
Reading list	[1] Halliday D., Resnick R. and Walker, J. (2011) *Fundamentals of Physics*, 9th edition, John Willey and Sons, Inc. [2] Alonso M. and Finn E.J. (1992) *Physics,* Addison-Wesley Publishing Company. [3] Hecht, E. (2000) *Physics: Calculus,* 2nd edition, Brooks/Cole. [4] Faughn/Serway (2006) *Serway's College Physics*, Thomson Brooks/Cole.

4. Learning Outcomes Matrix (optional)

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	PLO									
CLO	1	2	3	4	5	6	7	8	9	10
1	x									
2	x									
3										
4										

5. Planned learning activities and teaching methods

Week	**Topic**	**CLO**	**Assessments**	**Learning activities**	**Resources**
1-2	Chapter 1: Bases of Kinematics	1	Quiz1	Lecture, Discussion, Inclass-Quiz	[1].0. [2].1.
3-4	Chapter 2: The Law of Motion	1	HW1	Lecture, Inclass, HW	[1].9.
5-6-7	Chapter 3: Work and Mechanical Energy	3	Quiz2	Lecture, Discussion, Inclass-Quiz	[2].2.
8-9	Chapter 4: Linear Momentum and Collisions	2	HW2, Quiz3	Lecture, Group work, HW	[1]. 2, 4 [2]. 2

10	Midterm				
11-12	Chapter 5: Rotation of a Rigid Object About a Fixed Axis	3	HW3	Lecture, Group work, HW	[2]. 4. [1]. 18.
13-14	Chapter 6: Equilibrium and Elasticity	3		Lecture, Group work	[3]. 10
15-16	Chapter 7: Universal Gravitation	3	HW4	Lecture, Discussion, HW	[2]. 8
17	Final exam				

6. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
Attendance + Homework + in-class discussion (15%)				
Quizzes (Qz) / assignment (As) (15%)	Qz1, Qz3/ As.P1 50%Pass	Qz2, Qz4/ As.P2 50%Pass	Qz1, Qz2, Qz3, Qz4 / As.P3 50%Pass	Qz1, Qz2, Qz3, Qz4 / As.P4 50%Pass
Midterm exam (30%)	Q1, Q2, Q3 50%Pass	Q4, Q5 50%Pass	Q3, Q5 50%Pass	Q3, Q5 50%Pass
Final exam (40%)	Q1, Q2, Q3 50%Pass	Q4, Q5 50%Pass	Q3, Q5 50%Pass	Q3, Q5 50%Pass

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

7. Rubrics (optional)

5.1. Grading checklist

Grading checklist for Written Reports			
Student: …… HW/Assignment: ……. Date: …… Evaluator: ……			
	Max.	**Score**	**Comments**
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		

Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)	10		
TOTAL SCORE	100		

5.2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	**Description**
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined,	Issue/ problem to be considered critically is stated without clarification or description.

	full understanding.		ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	
Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation / evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.

Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**

Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker

	polished and confident.			appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandabl e but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Course Name: Speaking AE2

Course Code: EN012IU

1.General information

Course designation	*Giving presentations today becomes a vital skill for students to succeed not only in university but also at work in the future. Speaking AE2, therefore, provides students with the knowledge and skills needed to deliver effective presentations (informative and persuasive presentations).*
Semester(s) in which the course is taught	1, 2, 3
Person responsible for the course	Lecturers of Department of English
Language	English
Relation to curriculum	Compulsory
Teaching methods	Lecture, lesson, mini presentations
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: 90 Contact hours (lecture, exercise): 30 Private study including examination preparation, specified in hours[5]: 60
Credit points	2
Required and recommended prerequisites for joining the course	Students must complete AE1 courses

[5] When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.

<table>
<tr><td>Course objectives</td><td>Speaking AE2 aims at introducing an training students many aspects of giving a presentation: building up confidence, preparing and planning, using the appropriate language, applying effective visual aids, applying delivery techniques, dealing with questions and responding, performing body language, and so on.</td></tr>
<tr><td>Course learning outcomes</td><td>Upon the successful completion of this course, students will be able to:
<table>
<tr><th>Competency level</th><th>Course learning outcome (CLO)</th></tr>
<tr><td>Knowledge</td><td>CLO1. Understand many aspects of giving a presentation: building up confidence, preparing and planning, using the appropriate language, applying effective visual aids, applying delivery techniques, dealing with questions and responding, performing body language</td></tr>
<tr><td>Skill</td><td>CLO2. Prepare and deliver effective, formal, structured presentations that are appropriate to the specific environment and audience.</td></tr>
<tr><td>Attitude</td><td>CLO3. Deliver both informative and persuasive speech with confidence</td></tr>
</table></td></tr>
</table>

<table>
<tr><td>Content</td><td>The description of the contents should clearly indicate the weighting of the content and the level.
Weight: lecture session (2 hours)
Teaching levels: I (Introduce); T (Teach); U (Utilize)
<table>
<tr><th>Topic</th><th>Weight</th><th>Level</th></tr>
<tr><td>Orientation & Introduction
Needs analysis</td><td>2</td><td>I, T, U</td></tr>
<tr><td>Building up confidence</td><td>2</td><td>T, U</td></tr>
<tr><td>The first few minutes</td><td>2</td><td>T, U</td></tr>
<tr><td>Organizing what you want to say</td><td>2</td><td>T, U</td></tr>
<tr><td>Summarizing and concluding</td><td>2</td><td>T, U</td></tr>
<tr><td>Using equipment</td><td>2</td><td>T, U</td></tr>
<tr><td>Delivery techniques: Putting it all together</td><td>2</td><td>T, U</td></tr>
<tr><td>Group presentations for the instructor’s evaluation and advice</td><td>2</td><td>U</td></tr>
<tr><td>Introduction to persuasive speeches</td><td>2</td><td>T, U</td></tr>
<tr><td>Methods of persuasion</td><td>2</td><td>T, U</td></tr>
<tr><td>Maintaining interest</td><td>2</td><td>T, U</td></tr>
<tr><td>Dealing with problems and questions</td><td>2</td><td>T, U</td></tr>
<tr><td>Body language</td><td>2</td><td>T, U</td></tr>
<tr><td>Individual presentations for the instructor’s evaluation and advice</td><td>4</td><td>U</td></tr>
</table></td></tr>
<tr><td>Examination forms</td><td>Oral Presentations</td></tr>
</table>

Study and examination requirements	*Attendance* Regular on-time attendance in this course is expected. A student will be allowed no more than three absences. It is compulsory that the students attend at least 80% of the course to be eligible for the final examination. *Missed Tests* Students are not allowed to miss any of the tests (both Mid-term and Final). There are very few exceptions. Only with extremely reasonable excuses (e.g. certified paper from doctors), students may re-take the examination. *Class Behaviors* Students are required to treat their studying in college as a full-time job and spend an adequate amount of time for this Speaking AE2 course with approximately 8-10 hours per week (both in class and self-study). Accordingly, students are supposed to follow the obligations below: • Prepare thoroughly for each class in accordance with the course syllabus and complete home assignments as the instructor's request. • Participate fully and constructively in all course activities and discussions (if any). • Display appropriate courtesy to all involved in the class. • Provide constructive feedback to faculty members regarding their performance. *Plagiarism* Students are warned not to copy from other books or from their peers for all assessment tasks. Committing plagiarism will result in 0 point for the task. Students who plagiarize twice will be prohibited from sitting the final examination.
Reading list	[1] Lowe, S, & Pile, L. (2010). *Presenting.* Singapore: Cengage Learning [2] Comfort, J. (1997). *Effective presentations*. Oxford: Oxford University Press [3] Lucas, S. (2014). *The art of public speaking* (12th edition). New York: McGraw-Hill Education. [4] Harrington, D., & Lebeau, C. (2009). *Speaking of speech*. Macmillan

1. Learning Outcomes Matrix (optional)

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO					
CLO	1	2	3	4	5	6
1						
2						
3						
4						

2. Planned learning activities and teaching methods

WEEK	Content	MATERIAL(S) COVERED	ACTIVITIES
WEEK 1	· **Orientation & Introduction** · **Needs analysis**	[1] *Presenting*, p. 5	Students will: • receive an introduction to effectivepresentation • think about their strength and weaknesses in presenting in English • identify and prioritize their immediate and future needs forpresenting • share tips on improving weaknesses
WEEK 2	**Building up confidence**		Student will: - give a short speech about themselves to help them overcomeinitial shyness of standing up and speaking in public
WEEK 3	**Unit 1: The firstfew minutes**	• *Presenting*, pp. 8-13 • *Effective Presentations*: p.7 + video clip; p.13+ videoclip	Students will: • learn the importance of making agood first impression • learn useful phrases for greeting the audience, introducing themselvesand others, and giving the purpose of their presentation

WEEK 4	**Unit 3: Organizing whatyou want to say**	• *Presenting*, pp. 22-27) • *Effective Presentations*: p.19 +video clip	Students will: • look at the importance of structuring their presentation • learn the useful phrases for outlining their presentation, organizing ideas and moving between different sections of their presentation
WEEK 5	**Unit 6: Summarizing and concluding**	• *Presenting*, pp. 40-45 • *Effective Presentations*: p.41 +video clip	Students will: • look at ways of finishing apresentation effectively • learn useful phrases for endingtheir presentation, summarizing, handing over and thanking
WEEK 6	**Unit 2: Using equipment**	• *Presenting*, pp. 14-21) • *Effective Presentations*: p.31 +video clip	Students will: • use equipment and visuals tosupport their presentation • learn useful phrases for referringto visuals, ensuring their audience can see and expanding on notes
WEEK 7	**Delivery techniques: Putting it alltogether**	[2] *Effective Presentations*: p.50 + video clip Assignment: Topic(s) for group presentation)	Students will: • watch a model presentation and discuss do's and don'ts for effectivedelivery • pick group members and plan their presentations for Week 8
WEEK 8	Group presentations for the instructor's evaluation and advice		Students will: • take turn to deliver a presentation on the topic(s) assigned by the instructor • consult the instructor for advice on the mid-term exam preparation
MIDTERM EXAMINATION Students will give a five-to-six minute informative presentation on a topic to be determined.			

WEEK 9	**Introduction to persuasive speeches**	[3] *The art of public speaking*, Chapter 15 (Handout given by the instructor)	Students will: • know types of persuasive speeches • know typical organizations of apersuasive speech
WEEK 10	**Methods of persuasion**	[3] *The art of public speaking*, Chapter 16 (Handout given by the instructor)	Students will learn to persuade the audience by: • building credibility • using evidence • reasoning • appealing to emotions
WEEK 11	**Unit 4: Maintainin ginterest**	• *Presenting*: pp. 28-33) • *Effective Presentations*: p.25 +video clip)	Students will: • look at maintaining interestthrough effective delivery • learn useful phrases for clarifyingwhat you mean, checking if the audience is following and involving the audience
WEEK 12	**Unit 5: Dealing with problems and questions**	○ *Presenting*: pp. 34-39) ○ *Effective Presentations*: p.44(Question time)	Students will: • learn strategies for coping inunexpected situations • learn useful phrases for dealingwith problems and questions
WEEK 13	**Unit 6: Body language**	[2] *Effective Presentations* : pp.36-39	Students will: • practise using language and bodylanguage to communicate the message clearly and persuasively • watch video clips about bodylanguage • learn how to control posture, eye contact, gestures and voice inflection
WEEK 14	**Practice**	(to be determined by the instructor)	Students will: - deliver individual or group presentations (assigned by the instructor)

WEEK 15	**Wrap-up andadvice**	(to be determined by the instructor)	Students will: • consult the instructor for advice onthe final exam preparation • continue to deliver individual or group presentations (if any)
FINAL EXAMINATION Students will deliver a seven-to-eight-minute persuasive presentation on a topic to bedetermined			

3. Assessment plan

Assessment Type	CLO1	CLO2	CLO3
On-going Assessment (30%) (discussion, group presentation, individual presentation, and so on) *(It is requested that lecturers collect students' scripts or any type of evidence of their participation for possiblefact check).*	80% Pass	80% Pass	80% Pass
Midterm exam (30%) (Students will give a five-to-six-minute informative presentation on a topic to be determined)	80% Pass	80% Pass	80% Pass
Final exam (40%) (Students will deliver a seven-to-eight-minute persuasive presentation on a topic to be determined.)	80% Pass	80% Pass	80% Pass

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

1. Rubrics & Marksheets

2. Midterm exam rubrics and marksheets

	Very Poor	Poor	Average	Good	Excellent
Pronunciation, Voice Techniques (Pauses, Volume, Speed Change, Stress, Tone, Etc)	– Mumbles, often mispronounces, very difficult to understand. – Dead person talking, voice to text software does better	– Slurred speech, mispronounces some words. Difficult to understand. – Quiet, monotone, sing/song, little or no expression, boring.	– Clear voice, few pronunciation errors. Some slurring Most can understand the presentation – Some use of voice to show interest	– Crisp, clear voice, correct, precise pronunciation, all can understand. – proper volume; steady rate; enthusiasm; confidence	– Native like
Grammar& Vocabulary (Usage And Appropriateness For Audience)	– Frequent grammar or spelling errors – Inappropriate level. for the audience, Misuse vocabulary	– Noticeable Errors – Often too simple or sophisticated, inconsistent. Some vocabulary incorrectly used	– Minor errors – Generally appropriate, little variation or creativity	– No errors, but simple language – Always appropriate for the audience. Excellent use of vocabulary	– No errors. Excellent use of grammar to support ideas – Creative use of language
Body Language, Gestures, Eye Contact (Turns back to audience and reads screen – 0)	– Dead person on stage – Almost no eye contact, reads notes/screen	– Excessive movement or many distracting gestures – Occasionally eye contact, mostly reads notes/screen	– Some distracting gestures, and some movement and useful gestures – Generally maintains eye contact frequently reads notes/screen	– No distracting gestures. Body language supports speech – Excellent eye contact, seldom uses notes	– Excellent use of body language – Constant eye contact, no use of notes
Organization: Intro, Main, Ending, Coherence (see RATING CHECKLIST**)**	– Difficult to follow as disorganized	– Generally follows outline, poor introduction or conclusion.	– Follows outline, material generally well organized. Some use of transitions and linkage of ideas. Conclusion acceptable	– Follows outline, material well organized. – Ideas clearly linked. Some use of transitions	– Excellent, clear linkage of ideas. – Good transitions Arouses interest in Introduction, and summarizes clearly main points in conclusion
Content: Relevant/ Interesting/ Accurate	– Several errors or lacks critical information	– Some errors and has irrelevant information	– Information is generally accurate, minor errors, generally meets needs of the audience	– Accurate information, related to needs of audience	– No errors, answers all needs of the audience
Visual Aids: Appropriate, Clear (Movies, sound – 0)	– Slides consist of full paragraphs of text, no or superfluous graphics – Tiny font	– Slides have full sentences and occasional superfluous graphics, Difficult to read	– Slides have short phrases, Graphics relate to text and presentation. Easily read	– Attractive, informative graphics, only key words, easily understood, Good use of masking	– Professional quality, Excellent use of visual, no unrelated graphics, easily read, supports presentation
Overall effectiveness	– Ineffective, alienated audience	– Little positive effect or exchange of info.. Audience bored	– Audience learned something, no change in attitude	– Audience generally positive and learned from presentation	– Audience was kept interested and would remember key points

INTERNATIONAL UNIVERSITY
DEPARTMENT OF ENGLISH

SPEAKING AE2 - **MIDTERM** EXAMINATION
RATING CHECKLIST

ACADEMIC YEAR 2021 - 2022
DATE: _____

Student name : _____ Student ID : _____
Topic : _____

Wtg.	*Criteria*	*Very poor*	*Poor*	*Average*	*Good*	*Excellent*	*Comments*
15	**Pronunciation & Voice Techniques (Pause, Volume, Speed Change, Stress, Tone, etc.)**	*(1-3)*	*(4-6)*	*(7-9)*	*(10-12)*	*(13-15)*	
15	**Language use: Grammar & Vocabulary (usage and appropriateness for audience)**	*(1-3)*	*(4-6)*	*(7-9)*	*(10-12)*	*(13-15)*	
10	**Body Language: Gestures, Eye contact, Facial expressions** (turns back to the audience and reads from screen: 0 pt)	*(1-2)*	*(3-4)*	*(5-6)*	*(7-8)*	*(9-10)*	
20	**Organization: Intro, Body, Ending, Coherence** (see below)	*(1-4)*	*(5-8)*	*(9-12)*	*(13-16)*	*(17-20)*	
20	**Content: Relevance, Accuracy**	*(1-4)*	*(5-8)*	*(9-12)*	*(13-16)*	*(17-20)*	
10	**Visual aids: Appropriateness, Clarity** (Movies, sound: 0 pt)	*(1-2)*	*(3-4)*	*(5-6)*	*(7-8)*	*(9-10)*	
10	**Overall effectiveness**	*(1-2)*	*(3-4)*	*(5-6)*	*(7-8)*	*(9-10)*	
	FINAL SCORE: /100						

Negative points: ✧ Timing: <3m: *-15pts* 3m - 3m29: *-10pts* 3m30 - 3m59: *-5pts* 4m - 6m: OK >6m: *-5pts*

Organization:	*Yes*	*No*
A. Introduction		
a. Greeting, name, position *(Good morning ladies and gentlemen. My name is___. I'm a___)*	☐	☐
b. Purpose/ Objective *(The purpose of this talk is to ____)*	☐	☐
c. Connect with the audience *(I can see that all of you love to___)*	☐	☐
d. Outline/ Main part *(I've divided my presentation into ___ parts)*	☐	☐
e. Questions *(Should you have any questions, please save them until the end of my presentation)*	☐	☐
B. Body *(Transitions: Let's start with___/ That brings me to___/ Firstly, Secondly, Next, Lastly)*	☐	☐
C. Ending		
a. Signaling the end *(That brings me to the end of my presentation)*	☐	☐
b. Summary *(Let me just run over the key points again)*	☐	☐
c. Closing *(Thank you very much for your attention)*	☐	☐
d. Inviting questions *(I'd be glad to answer any questions you might have)*	☐	☐

Examiner : .....

3. Final exam rubrics and marksheets

	Very Poor	Poor	Average	Good	Excellent
Pronunciation, Voice Techniques (Pauses, Volume, Speed Change, Stress, Tone, etc.)	– Mumbles, often mispronounces, very difficult to understand. – Dead person talking, voice to text software does better	– Slurred speech mispronounces some words. Difficult to understand. – Quiet, monotone, sing/song, little or no expression, boring.	– Clear voice, few pronunciation errors. Some slurring Most can understand the presentation – Some use of voice to show interest	– Crisp, clear voice, correct, precise pronunciation, all can understand. – Proper volume; steady rate; enthusiasm; confidence	– Native like
Grammar & Vocabulary (Usage and Appropriateness for Audience)	– Frequent grammar or spelling errors – Inappropriate level. for the audience, Misuse vocabulary	– Noticeable Errors – Often too simple or sophisticated, inconsistent. Some vocabulary incorrectly used	– Minor errors – Generally appropriate, little variation or creativity	– No errors, but simple language – Always appropriate for the audience. Excellent use of vocabulary	– No errors. Excellent use of grammar to support ideas – Creative use of language
Body Language: Posture, Gestures, Eye contact, Facial expression (Turns back to audience and reads screen – 0)	– Dead person on stage – Almost no eye contact, reads notes/screen	– Excessive movement or many distracting gestures – Occasionally eye contact, mostly reads notes/screen	– Some distracting gestures, and some movement and useful gestures – Generally maintains eye contact frequently reads notes/screen	– No distracting gestures. Body language supports speech – Excellent eye contact, seldom uses notes	– Excellent use of body language – Constant eye contact, no use of notes
Organization: Intro, Main, Ending, Coherence (see RATING CHECKLIST**)**	– Difficult to follow as disorganized	– Generally follows outline, poor introduction or conclusion.	– Follows outline, material generally well organized. Some use of transitions and linkage of ideas. – Conclusion acceptable	– Follows outline, material well organized. – Ideas clearly linked. Some use of transitions	– Excellent, clear linkage of ideas. – Good transitions Arouses interest in Introduction, and summarizes clearly main points in conclusion
Content: Relevant/Accurate, Informative and Persuasive	– Several errors or lacks critical information	– Some errors and has irrelevant information – Just focus on giving information	– Information is generally accurate, minor errors – Give reasons with little or no emphasis on persuasion	– Accurate information, related to needs of audience – Give frequent emphasis on persuasion	– No errors, answers all needs of the audience – Persuade the audience well
Visual Aids: Appropriateness, Clarity *(Use of video clip exceeding 20 seconds – 0)*	– Slides consist of full paragraphs of text, no or superfluous graphics – Tiny font	– Slides have full sentences and occasional superfluous graphics, – Difficult to read	– Slides have short phrases; Graphics relate to text and presentation. Easily read	– Attractive, informative graphics, only key words, easily understood, good use of masking	– Professional quality, Excellent use of visual, no unrelated graphics, easily read, supports presentation
Question response	– Welcomes the question	– Listens carefully, doesn't interrupt	– Thinks before answering – Clarifies, rephrases as needed	– Answers correctly and briefly	– Checks to see if questioner is satisfied

INTERNATIONAL UNIVERSITY
DEPARTMENT OF ENGLISH

SPEAKING AE2 - **FINAL EXAMINATION**
RATING CHECKLIST

ACADEMIC YEAR 2021 – 2022
DATE: _____

Student name : ..... Student ID : .....
Topic : .....

Wtg.	*Criteria*	*Very poor*	*Poor*	*Average*	*Good*	*Excellent*	*Comments*
15	**Pronunciation & Voice Techniques (Pause, Volume, Speed Change, Stress, Tone, etc.)**	*(1-3)*	*(4-6)*	*(7-9)*	*(10-12)*	*(13-15)*	
10	**Language use: Grammar & Vocabulary (usage and appropriateness for audience)**	*(1-2)*	*(3-4)*	*(5-6)*	*(7-8)*	*(9-10)*	
15	**Body Language: Posture, Gestures, Eye contact, Facial expression** (turns back to the audience and reads from screen: 0 pt)	*(1-3)*	*(4-6)*	*(7-9)*	*(10-12)*	*(13-15)*	
15	**Organization: Intro, Body, Ending, Coherence** (see below)	*(1-3)*	*(4-6)*	*(7-9)*	*(10-12)*	*(13-15)*	
20	**Content: Relevant, Accurate, Informative and Persuasive**	*(1-4)*	*(5-8)*	*(9-12)*	*(13-16)*	*(17-20)*	
15	**Visual aids: Appropriateness, Clarity** (Movies, sound: 0 pt)	*(1-3)*	*(4-6)*	*(7-9)*	*(10-12)*	*(13-15)*	
10	**Question response**	*(1-2)*	*(3-4)*	*(5-6)*	*(7-8)*	*(9-10)*	
	SCORE (max.100): _____	*BONUS (max.10): _____*				**TOTAL SCORE (max.100): _____**	

Deduction points: ✧ No references: -10 ✧ Timing: <5m: *-15pts* 5m - 5m29: *-10pts* 5m30 - 5m59: *-5pts* >8m: *-5pts*

Bonus points: *Up to **10pts for creativity**, which involves PowerPoint design, Organization of information, Presentation style ...*

Organization:	*Yes*	*No*
A. Introduction		
a. Greeting, name, position *(Good morning, ladies and gentlemen. My name is___. I'm a___)*	☐	☐
b. Connect with the audience *(I can see that all of you love to__)*	☐	☐
c. Purpose/ Objective *(The purpose of this talk is to ____)*	☐	☐
d. Time length *(My presentation should last for __)*	☐	☐
e. Outline/ Main part *(I've divided my presentation into __ parts)*	☐	☐
f. Questions *(Should you have any questions, please save them until the end of my presentation)*	☐	☐
B. Body *(Transitions: Let's start with___/ That brings me to___/ Firstly, Secondly, Next, Lastly)*	☐	☐
C. Ending		
a. Signaling the end *(That brings me to the end of my presentation)*	☐	☐
b. Summary *(Let me just run over the key points again)*	☐	☐
c. Closing *(Thank you very much for your attention)*	☐	☐
d. Inviting questions *(I'd be glad to answer any questions you might have)*	☐	☐

Examiner : _____

Date revised: 15 August, 2022

Course Name: Writing AE2

Course Code: EN011IU

1.General information

Course designation	*This course introduces basic concepts in research paper writing, especially the role of generalizations, definitions, classifications, and the structure of a research paper to students who attend English- medium college or university. It also provides them with methods of developing and presenting an argument, a comparison or a contrast.*
Semester(s) in which the course is taught	1, 2, 3
Person responsible for the course	Lecturers of Department of English
Language	English
Relation to curriculum	Compulsory
Teaching methods	Lecture, lesson, project
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: 90 Contact hours (lecture, exercise): 30 Private study including examination preparation, specified in hours: 60
Credit points	2
Required and recommended prerequisites for joining the course	Students must complete Writing AE1 course
Course objectives	Students are required to work on the tasks selected to maximize their exposure to written communication and are expected to become competent writers in the particular genre: the research paper. As writing is part of an integrated skill of reading and writing where reading serves as input to trigger writing, this course is designed to familiarize non-native students with academic literature in their major study by having them read and critically respond to texts of a variety of topics ranging from natural

	sciences such as biology to social sciences and humanities like education, linguistics and psychology.
Course learning outcomes	Upon the successful completion of this course, students will be able to:

Competency level	Course learning outcome (CLO)
Knowledge	**CLO1. Understand the structure of a research paper and employ appropriate academic language in writing a research paper**
Skill	**CLO2. Read critically, analyze, and annotate academic articles and journals** **CLO3. Employ the research writing skills obtained to work on their own paper in their major study.**
Attitude	**CLO4. Reason around ethical issues in writing research paper and avoid committing plagiarism**

Content

The description of the contents should clearly indicate the weighting of the content and the level.

Weight: lecture session (2 hours)

Teaching levels: I (Introduce); T (Teach); U (Utilize)

Topic	Weight	Level
Unit 1: The Academic Writing Process Introduction	**4**	**I, T, U**
Unit 2: Researching and Writing	**2**	**T, U**
Unit 3: Fundamentals & Feedback	**2**	**T, U**
Unit 4: Definitions, Vocabulary & Clarity	**2**	**T, U**
Unit 5: Generalizations, Facts and Honesty	**4**	**T, U**
Unit 6: Seeing Ideas and Sharing Texts	**2**	**T, U**
Unit 7: Description, Methods & Reality	**2**	**T, U**
Unit 8: Results, Discussion & Relevance	**2**	**T, U**
Unit 9: The Whole Academic Text	**2**	**T, U**
Unit 10: Creating the Whole Text	**4**	**T, U**
Course Review	**2**	**U**

Examination forms	Essay writing
Study and examination requirements	*Attendance* Regular on-time attendance in this course is expected. A student will be allowed no more than three absences. It is compulsory that the students attend at least 80% of the course to be eligible for the final examination. *Assignment (Literature review)* Purpose: Students will use the knowledge of paraphrasing, summarising, developing arguments, and APA styles to write a 1,000-word literature review on a research scope of their choice. Task: • Follow guidelines on how to write a literature review. • Use relevant academic writing skills such as paraphrasing, summarising, developing arguments, and APA 7th Style Guidelines – see https://www.apastyle.org/ • Develop arguments in relation to the research scope and identify the research gap **Notes:** All papers should be typed, double-spaced, in 13-pt font, and with 1-inch margins. All papers must be original for this class. Criterion-referenced grading is used in this course. *Missed Tests* Students are not allowed to miss any of the tests (both Mid-term and Final). There are very few exceptions. Only with extremely reasonable excuses (eg. certified paper from doctors), students may re- take the examination. *Class Behaviors* Students are required to treat their studying in college as a full-time job and spend an adequate amount of time for this Writing AE2 course with approximately 8-10 hours per week (both in class and self- study). Accordingly, students are supposed to follow the obligations below: • Prepare thoroughly for each class in accordance with the course syllabus and complete home assignments as the instructor's request. • Participate fully and constructively in all course activities and discussions (if any). • Display appropriate courtesy to all involved in the class. • Provide constructive feedback to faculty members regarding their performance. *Plagiarism*

<table>
<tr>
<td></td>
<td>
All forms of plagiarism and unauthorised collusion are seriously regarded and could result in penalties.
Plagiarism occurs when students copy or reproduce people's words or ideas and then present them as students' own work without proper acknowledgement, including when students copy the work of their fellow students.
Plagiarism in student submissions can be detected by:

some web-based programs such as SafeAssign or Turnitin, or
examiner's judgments with evidence of originals

The rater will review the paper to check if citations or references are provided properly. Penalties due to improper citations or references include:
<table>
<tr><th>Degree of magnitude</th><th>Description</th></tr>
<tr><td>Below 15%</td><td>Marked as it is.</td></tr>
<tr><td>15% - 25%</td><td>The score is deducted by 25%.</td></tr>
<tr><td>25% - 40%</td><td>The score is deducted by 50%</td></tr>
<tr><td>Over 40%</td><td>The score is 0.</td></tr>
</table>
Notes: Part of the test is marked as it is if no plagiarism is detected. Students who plagiarize over 40% <u>twice</u> will be prohibited from sitting the final examination.
Writing Center (Room 509)
Students are encouraged to visit the Writing Center or to schedule an appointment for additional help.
</td>
</tr>
<tr>
<td>Reading list</td>
<td>
[1] Hamp-Lyons, L., & Heasley, B. (2006). Study Writing. Cambridge, UK: Cambridge University Press
[2] Articles and Essays taken from The Allyn and Bacon Guide to Writing by Ramage et al (2009), Pearson Longman.
[3] Cormack, J. & Slaught, J. (2009). English for academic study: Extended writing and research skills. Cambridge: Cambridge University Press. Garnet Education
[4] Folse, K. S. & Pugh, T. (2010). Great writing 5: Greater essays. Boston: Heinle, Cengage Learning.
[5] Keezer, S. (Ed.) (2003). Write your research report: A real-time guide. New Jersey: Pearson Learning Group.
[6] Kumar, R. (2019). Research methodology: A step-by-step guide for beginners. Sage Publications
</td>
</tr>
</table>

2. Learning Outcomes Matrix (optional)

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO					
CLO	1	2	3	4	5	6
1						
2						
3						
4						

3. Planned learning activities and teaching methods

WEEK	CONTENT—SUGGESTED TASKS	ASSIGNMENT/ HOMEWORK
1	**Orientation of the Course** **<u>Unit 1:</u> The Academic Writing Process Introduction**	
2	**<u>Unit 1:</u> The Academic Writing Process (Cont.)** Thinking about writing processes Distinguishing between academic and personal styles of writing Grammar of academic discourse	HW: Task 10
3	**<u>Unit 2:</u> Researching and Writing** Recognizing categories and classification The language of classification The structure of a research paper	HW: Task 17
4	**<u>Unit 3:</u> Fundamentals & Feedback** Exploring comparison and contrast structures The language of comparison and contrast Using comparisons and contrasts to evaluate and recommend	HW: Task 12
5	**<u>Unit 3:</u> Fundamentals & Feedback (Cont.)** The research paper Identifying a research gap The writing process	**Assignment 1: Task 20**
6	**<u>Unit 4:</u> Definitions, Vocabulary & Clarity** The clarity principle The language of definition The place of definition The writing process	HW: Task 15
7	**<u>Unit 5:</u> Generalizations, Facts and Honesty** Honesty principle The language of generalization	HW: Task 13
8	**<u>Unit 5:</u> Generalizations, Facts and Honesty (Cont.)** Writing a literature review The writing process Brainstorming and clustering APA 7th Style Guidelines – see https://www.apastyle.org/	**Assignment 2: Writing Literature review**
MID-TERM EXAMINATION		

9	**<u>Unit 6:</u> Seeing Ideas and Sharing Texts** Writing about events in time Connecting events Learning about peer reviews	HW: Tasks 12 & 13
10	**<u>Unit 7:</u> Description, Methods & Reality** Describing processes and products The language for writing about processes Writing the Methods section Giving and getting formal peer feedback	HW: Tasks 9 & 11
11	**<u>Unit 8:</u> Results, Discussion & Relevance** What is an argument? The language of argument The Results and Discussion sections Finding an academic voice	HW: Task 9
12	**<u>Unit 9:</u> The Whole Academic Text** S-P-S-E: Focus on structure S-P-S-E in the introduction The language of coherence and connection Teacher evaluation	HW: Task 9
13	**<u>Unit 10:</u> Creating the Whole Text** Structure of the research paper Creating your own research	
14	**<u>Unit 10:</u> Creating the Whole Text** Plagiarism Creating citations Paraphrase and summary Authorial identity	
15	**Course Review**	**Submitting Literature review**
FINAL EXAM		

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
Class participation and Assignments (30%)	80% Pass	80% Pass	80% Pass	
Midterm exam (30%)	80% Pass		80% Pass	80% Pass
Final exam (40%)	80% Pass		80% Pass	80% Pass

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics

5.1. Midterm exam sample rubrics (100 points)

TASK 1: 30 points

CATEGORIES	CRITERIA	POINTS	CLO
Category	Farm animals seem to have more complex cognitive and social skills	**7.5**	CLO 1,2
Sub-category 1	1. Sheep experience stress a. increase stress (when isolated from the flock) b. reduce stress (when seeing familiar sheep faces)	**7.5**	
Sub-category 2	2. Cows' co-operative partnerships & physiological response on learning something new a. Those learning tasks experience an increase in heart rate (when facing same situation). b. Those not learning tasks do not experience a heart rate increase.	**7.5**	CLO 1,2
Sub-category 3	3. Pigs' different reactions react differently based on past experience a. avoid the place where they have been shut for long b. go for the place where they were released from quickly.	**7.5**	CLO 1,2
	Total	**30**	

TASK 2: 70 points

CATEGORIES	CRITERIA	POINTS	CLO

Content	All main points relevant to topic Essay question fully answers	**20**	CLO 1,3,4
Organization	Topic and purpose of the essay discussed in the introduction Each main point discussed in a paragraph All main points summarized and rephrased in the conclusion	**20**	CLO 1,3,4
Coherence	Paragraphs ordered in a systematic manner based on, for example, importance, priority, etc. Comparison/contrast transitions are properly used.	**15**	CLO 1,3,4
Style and Tone	Formal writing with full forms Polite writing Academic vocabulary	**15**	CLO 1,3,4
	Total	**70**	

5.2. Final exam rubrics: 100 points

CATEGORIES	CRITERIA	POINTS	CLO
Content	• Presenting his/her view on the question clearly and persuasively	**20**	CLO 1,3,4
Structure of ideas	• Introduction with thesis statement, and conclusion with summary and comment • Topic sentences well supported with explanations, examples, etc.	**40**	CLO 1,3,4
Convincing argumentative techniques, e.g., counterargument		**20**	CLO 1,3,4
Language use: *use vocabulary and grammatical structures*		**20**	CLO 1,3,4
	Total	**100**	

Date revised: 15 August, 2022

Course Name: Digital Logic Design

Course Code: IT067

1. General information

Course designation	Provide fundamentals of logic design, such as: number presentation and codes, Boolean algebra and basic tools for design with combinational and sequential digital logic.
Semester(s) in which the course is taught	3
Person responsible for the course	Assoc. Prof. Dr. Dinh Duc Anh Vu
Language	English
Relation to curriculum	CS, IT: Compulsory
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	Total workload: 135 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 45 (lecture) Private study including examination preparation, specified in hours: 90
Credit points	Number of credits : 3 Lecture: 3 Laboratory: 0
Required and recommended prerequisites for joining the course	
Course objectives	This course is to provide fundamentals of logic design, such as: number presentation and codes, Boolean algebra and basic tools for design with combinational and sequential digital logic.
Course learning outcomes	CLO 1. Explain the presentation of number, codes systems. CLO 2. Demonstrate the operation of arbitrarily basic combinational and sequential circuits. CLO 3. Design basic combinational and sequential circuits. CLO 4. Follow the discussions of instructors and classmates. **Competency level** / **Course learning outcome (CLO)** Knowledge: CLO1, CLO2, CLO3 Skill: CLO3 Attitude: CLO4
Content	*The description of the contents should clearly indicate the weighting of the content and the level.* Weight: lecture session (~~3~~ hours)

	Teaching levels: I (Introduce); T (Teach); U (Utilize)

Topic	Weight	Level
Number systems, arithmetic and codes	6	I,T
Boolean algebra and Logic Gates	9	I,T
Combinational Circuits	9	T,U
Sequential logic and flip-flops	9	T,U
Arithmetic logic Circuits	6	T,U
Counters, stacks and registers	6	I,T

Examination forms	Multiple-choice questions, short-answer questions
Study and examination requirements	Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. Assignments/Examination: Students must have more than 50/100 points overall to pass this course.
Reading list	1. Ronald J. Tocci, Neal S.Widmer, Digital Systems Principles and Applications, Prentice Hall Inc (2007) 2. J.F. Wakerly, Digital Design: Principles & Practices 4th, 2004

2. Learning Outcomes Matrix (optional)

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO					
CLO	1	2	3	4	5	6
1	X					
2	X					
3		X				
4	X	X				

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
1,2	Number systems, arithmetic and codes	CLO1	Midterm Exam	Reading Group Presentation	Textbooks
3,4,5	Boolean algebra and Logic Gates	CLO1	Midterm Exam	Reading Lecture	Textbooks Lecture notes
	Midterm				

6,7,8	Combinational Circuits	CLO2,CLO4	Quiz Final Exam	Reading Lecture Discuss	Textbooks Lecture notes
9,10,11	Sequential logic and flip-flops	CLO2,CLO4	Exercise Final Exam	Reading Lecture Discuss Exercise	Textbooks Lecture notes
12,13	Arithmetic logic Circuits	CLO3,CLO4	Exercise Final Exam	Reading Lecture Discuss Exercise	Textbooks Lecture notes
14,15	Counters, stacks and registers	CLO3,CLO4	Exercise Final Exam	Reading Lecture Discuss Exercise	Textbooks Lecture notes
	Final exam				

4. Assessment plan

Assessment Type	**CLO1**	**CLO2**	**CLO3**	**CLO4**
Midterm examination (30%)	30%			
Final examination (40%)		20%	20%	
Exercises/ Quiz (30%)		10%	10%	10%

Note: %Pass: Target that 90% of students having scores greater than 50 out of 100.

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1. When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.↩

Rubrics (optional)

1. Grading checklist

Grading checklist for Written Reports			
Student: …….. Date: ……	HW/Assignment: ……. Evaluator: ……		
	Max.	**Score**	**Comments**
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		

Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)	10		
TOTAL SCORE	100		

2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	**Description**
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored,	Issue/ problem to be considered critically is stated without clarification or description.

			boundaries undetermined, and/ or backgrounds unknown.	
Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation / evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into	Specific position (perspective, thesis/hypothesis) takes into account the complexities of	Specific position (perspective, thesis/ hypothesis) acknowledges different	Specific position (perspective, thesis/ hypothesis) is stated, but is

	account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	sides of an issue.	simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequence s and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequence s and implications) are oversimplifie d.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable

	consistently observable and is skillful and makes the content of the presentation cohesive.	consistently observable within the presentation.	observable within the presentation.	within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities)

	authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022

Dean of School of Computer Science and Engineering

Assoc.Prof. Nguyen Van Sinh

Course Name: Digital Logic Design Lab

Course Code: IT099

1. General information

Course designation	This subject covers the fundamental knowledge of digital logic design laboratory
Semester(s) in which the course is taught	3
Person responsible for the course	Dr. Ly Tu Nga
Language	English
Relation to curriculum	Compulsory (CS, NE, CE)
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	Total workload: 60 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 30 (laboratory) Private study including examination preparation, specified in hours: 30
Credit points	Number of credits : 1 Lecture: 0 Laboratory: 1
Required and recommended prerequisites for joining the course	Digital Logic Design
Course objectives	This course provides students the fundamentals of digital logic design concepts, a sequence of laboratory experiments to present and illustrate theory of digital logic design involving Logic gates, Combinational logic circuit, MSI combinational logic circuit, Flip Flops and Counters, Counter ICs, and Shift register. Students apply contemporary agile requirements analysis, implementation and testing practices to digital logic design project work in small teams.
Course learning outcomes	CLO 1. use laboratory equipment in digital logic design. CLO 2. design, construct, analyze, and troubleshoot simple combinational and sequential circuits. CLO 3. measure and record the experimental data, analyze the results, and prepare a laboratory report for submission. CLO 4. Have an opportunity to exam case studies to understand the professional and ethical responsibility as an engineer. **Competency level** | **Course learning outcome (CLO)**

Knowledge	CLO1	
Skill	CLO2,3	
Attitude	CLO4	

Content

The description of the contents should clearly indicate the weighting of the content and the level.
Weight: lecture session (~~3~~ hours)
Teaching levels: I (Introduce); T (Teach); U (Utilize)

Topic	**Weight**	**Level**
Logic gates and combinational logic	2	I,T
MSI combinational logic	1	T,U
MSI Combinational logic (cont.)	1	T,U
Flip flops and counters	2	T,U
Counter ICs (part I)	1	T,U
Counter ICs (part II)	1	T,U
Shift Register	2	T,U

Examination forms

Short-answer questions

Study and examination requirements

Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.
Assignments/Examination: Students must have more than 50/100 points overall to pass this course.

Reading list

[1] M.M. Mano and M.D. Ciletti, Digital Design 4th, 2007
[2] J.F. Wakerly, Digital Design: Principles & Practices 4th, 2004
[3] R.J Tocci and N.S. Widner, Digital Systems - Principles and Applications 8th, 2001

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-3) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO					
CLO	1	2	3	4	5	6
1	✓	✓				
2	✓	✓				
3			✓			✓
4			✓			✓

3. **Planned learning activities and teaching methods**

Week	Topic	CLO	Teaching and Learning activities	Assessments	Resources
1	Logic gates and combinational logic	CLO1,3	-Practice and demo -Class discussion	-Report	[1,2]
2	MSI combinational logic	CLO2,3	-Practice and demo -Class discussion	-Report	[1,2]
3	MSI Combinational logic (cont.)	CLO2,3	-Practice and demo -Class discussion	-Report	[1,2]
5	Flip flops and counters	CLO2,3,4	-Practice and demo -Class discussion	-Report	[1,3]
6	Counter ICs (part I)	CLO2,3,4	-Practice and demo -Class discussion	-Report	[1,3]
7	Counter ICs (part II)	CLO2,3,4	-Practice and demo -Class discussion	-Report	[1,3]
8	Shift Register	CLO2,3,4	-Practice and demo -Class discussion	-Report	[1,3]
9	**Final exam**		Practice	Written exam	

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
Final examination (30%)	30%	30%	30%	30%
Exercises/ Quiz (70%)	70%	70%	70%	70%

1. When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.↩

Rubrics (optional)

1. **Grading checklist**

Grading checklist for Written Reports	
Student: ……..	HW/Assignment:
Date: ……	…….
	Evaluator:
	……

	Max.	Score	Comments
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)	10		
TOTAL SCORE	100		

2. **Holistic rubric**

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	**Description**
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

3. **Analytic rubric**

Critical thinking value rubric for evaluating questions in exams:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensivel	Issue/ problem to be considered critically is stated, described, and clarified so that	Issue/ problem to be considered critically is stated but	Issue/ problem to be considered critically is stated without clarification

	y, delivering all relevant information necessary for full understanding.	understanding is not seriously impeded by omissions.	description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	or description.
Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation / evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.

Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**

Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.

Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022

Dean of School of Computer Science and Engineering

Assoc.Prof. Nguyen Van Sinh

Course Name: Object-Oriented Programming

Course Code: IT069IU

2. **General information**

Course designation	This subject introduces students to the object-oriented programming from basic notions to professional principles for designing an object-oriented software.
Semester(s) in which the course is taught	3
Person responsible for the course	Dr. Tran Thanh Tung
Language	English
Relation to curriculum	Compulsory (all programs)
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	Total workload: 195 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 45 (lecture) + 30 (laboratory) Private study including examination preparation, specified in hours: 120
Credit points	Number of credits: 4 Lecture: 3 Laboratory: 1
Required and recommended prerequisites for joining the course	Prerequisite course of OOP: C/C++ Programming
Course objectives	Introduction to object-oriented programming and design. Topics include core terminologies and basic design principles of object-oriented programming such as classes, objects, abstraction, encapsulation, inheritance, polymorphism, the SOLID design principles, and design patterns
Course learning outcomes	CLO 1. Explain and use concepts in object-oriented programming including classes, objects, abstraction, encapsulation, inheritance, and polymorphism. CLO 2. Implement an object-oriented solution in JAVA programming language. CLO 3. Analyze design principles and design patterns in object-oriented programing

Competency level	**Course learning outcome (CLO)**
Knowledge	CLO1
Skill	CLO2, **CLO3**

		Attitude		

Content

The description of the contents should clearly indicate the weighting of the content and the level.
Weight: lecture session (3 hours)
Teaching levels: I (Introduce); T (Teach); U (Utilize)

Topic	**Weight**	**Level**
Introduction to Java	3	I
Introduction to Object-Oriented Programming	3	I, T
Classes and Objects	3	T
Inheritance and composition	3	T
Polymorphism	3	T
Design with interfaces and abstract classes	3	T
Building Objects	3	T
Exception handling	3	T
Generic classes and methods	3	T
Introduction to SOLID principles Single responsibility principle	3	T, U
Open/closed principle	1.5	T, U
Lisko substitution principle	1.5	T, U
Interface segregation principle	1.5	T, U
Dependency inversion principle	1.5	T, U
Reusing Designs Through Design Patterns	6	T, U

Examination forms

Short-answer questions

Study and examination requirements

Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.
Assignments/Examination: Students must have more than 50/100 points overall to pass this course.

Reading list

5. Paul J. Deitel (Author), Harvey Deitel (Author), Java How To Program, 11th Edition, Prentice Hall, 2017
6. Matt Weisfeld, The Object-Oriented Thought Process, 3rd Edition, Addison-Wesley, 2009
7. Erich Gamma, Richard Helm, Ralph Johnson and John Vlissides, Design Patterns: Elements of Reusable Object-Oriented Software, Addison-Wesley Professional, 1994
8. Eric Freeman, Bert Bates, Kathy Sierra and Elisabeth Robson, Head First Design Patterns: A Brain-Friendly Guide, O'Reilly Media, 2004

3. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO					
CLO	1	2	3	4	5	6
1	XX					
2		XX				X
3		XXX				X

4. Planned learning activities and teaching methods

Week	**Topic**	**CLO**	**Assessments**	**Learning activities**	**Resources**
1	Introduction to Java	1	Quiz	Lecture	[1]
2	Introduction to Object-Oriented Programming	1	Quiz	Lecture, Discussion	[1,2]
3	Classes and Objects	2	Quiz, Lab, Midterm	Lecture, Discussion, In-class exercises	[1,2]
4	Inheritance and composition	2	Quiz, Lab, Midterm	Lecture, Discussion, In-class exercises	[1,2]
5	Polymorphism	2	Quiz, Lab, Midterm	Lecture, Discussion, In-class exercises	[1,2]
6	Design with interfaces and abstract classes	2,3	Quiz, Lab, Midterm	Lecture, Discussion, In-class exercises	[1,2]
7	Building Objects	2,3	Quiz, Lab, Midterm	Lecture, Discussion, In-class exercises	[1,2]
8	Exception handling	1,2	Quiz	Lecture	[1]
9	**Midterm**				
10	Generic classes and methods	2,3	Quiz, Lab, Final	Lecture, Discussion, In-class exercises	[1,2]

11	Introduction to SOLID principles Single responsibility principle	2,3	Quiz, Project, Final	Lecture, Discussion, In-class exercises	[1,3,4]
12	Open/closed principle Lisko substitution principle	2,3	Quiz, Project, Final	Lecture, Discussion, In-class exercises	[1,3,4]
13	Interface segregation principle Dependency inversion principle	2,3	Quiz, Project, Final	Lecture, Discussion, In-class exercises	[1,3,4]
14	Reusing Designs Through Design Patterns, part 1	2,3	Quiz, Project, Final	Lecture, Discussion, In-class exercises	[1,3,4]
15	Reusing Designs Through Design Patterns, part 2	2,3	Quiz, Project, Final	Lecture, Discussion, In-class exercises	[1,3,4]
16	**Final exam**				

5. Assessment plan

Assessment Type	**CLO1**	**CLO2**	**CLO3**
Quiz (5%)	10%		20%
Labs (10%)	30%	30%	
Midterm examination (30%)	50%	40%	
Projects/Presentations/ Report (15%)	10%		30%
Final examination (40%)		30%	50%

6. Rubrics (optional)

5.4. Grading checklist

Grading checklist for Written Reports			
Student: …….. Date: ……	HW/Assignment: ……. Evaluator: ……		
	Max.	**Score**	**Comments**
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		

Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)	10		
TOTAL SCORE	100		

5.5. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	**Description**
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.6. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored,	Issue/ problem to be considered critically is stated without clarification or description.

			boundaries undetermined, and/ or backgrounds unknown.	
Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation / evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.

Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**

Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.

Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022

Dean of School of Computer Science and Engineering

Assoc.Prof. Nguyen Van Sinh

Course Name: Linear Algebra

Course Code: IT154IU

1. **General information**

Course designation	Linear algebra provides a mathematical framework for organizing information and then using that information to solve problems, especially data analytics problems. Linear algebra is essential for understanding and creating machine learning algorithms, especially neural network and deep learning models.
Semester(s) in which the course is taught	2, 3
Person responsible for the course	Mai Hoang Bao An, PhD.
Language	English
Relation to curriculum	Compulsory
Teaching methods	Lecture, lesson, demo.
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: 135 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 45 (lecture) Private study including examination preparation, specified in hours: 90
Credit points	Number of credits: 3 Lecture: 3 Laboratory: 0
Required and recommended prerequisites for joining the course	Calculus 2
Course objectives	This course will provide students with the foundations of linear algebra knowledge necessary for machine learning and neural network modelling. Students will learn the overview of basic matrices and vector algebra as applied to linear systems. Then they will learn how to manipulate matrices to derive useful knowledge from data, quantify the degree of learning, and optimizing the speed of learning in vector spaces and linear transformations for data discovery. The hands-on lessons and assignments will equip students with the mathematical background required to build and train simple neural networks in data mining applications.

Course learning outcomes	CLO 1. Understand concepts of vector space, matrices, tensor, linear system and their application in other fields of study. Get familiar with the fundamental concepts of linear spaces. CLO 2. Know how to use Python to handle with matrices and linear systems. Get to know and understand the fundamental concepts of abstract vector spaces and their relationships with matrix algebra. CLO 3. Understand the concepts and applications of linear dependence/independence, spans and linear transformation. Apply principles of matrix algebra to linear transformation. Understand the Isomorphic Vector Spaces and applications. CLO 4. Determine eigenvalues and eigenvectors and solve eigenvalue problems. Introduction to determinant and its properties and applications. The use case of carrying out matrix operations in machine learning. **Competency level** / **Course learning outcome (CLO)** Knowledge: CLO 1, CLO 2, CLO 3, CLO 4 Skill: CLO 2, CLO 4 Attitude: CLO 1, CLO 2, CLO 3, CLO 4
Content	*The description of the contents should clearly indicate the weighting of the content and the level.* Weight: lecture session (~~3~~ hours) Teaching levels: I (Introduce); T (Teach); U (Utilize)

Topic	Weight	Level
Introduction to python, colab What is linear structures	1	I, U
Fundamentals and geometry of $\mathbb{R}^n$ space Matrix algebra: vectors, matrices. Linear systems, parametric equations and systems of linear equations	2	T, U
Solving systems of linear equations Subspace of $\mathbb{R}^n$, linear independence, base and dimension in $\mathbb{R}^n$ Python in linear algebra	2	T, U
Solving linear system with numpy Norm in $\mathbb{R}^n$ with Python	1	T, U
Abstract vector spaces, base and dimension for abstract vector spaces. Special kinds of matrices and vectors.	1	T, U
Span in abstract vector spaces. Fundamentals of linear transformations. Demo of linear transformations in Python.	2	T, U

	Linear Transformation in abstract vector space Linear Transformation and Inverses	1	T, U
	Geometric Transformation of Plane, Image and Kernel, Isomorphism and linear map Isomorphic Vector Spaces	1	I, T, U
	Introduction to determinant Determinant expansions. Properties of determinant.	1	I, T
	Elementary Row Operations and the Determinant Eigenvectors and Eigenvalues, Eigen-decompositions Introduction to some application of linear algebra: PCA, OLS, …	2	I, T, U
Examination forms	Short-answer questions, Long-answer questions, programming questions		
Study and examination requirements	Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. Assignments/Examination: Students must have more than 50/100 points overall to pass this course.		
Reading list	**1.** R.O. Hill, Elementary Linear Algebra and Its applications, 3rd edition **2.** B. Kolman and David R. Hill, Introductory Linear Algebra: An Applied First Course (8th edition, 9th edition) **3.** Jim Hefferon, Linear Algebra, 4th edition. **4.** github: Python in linear algebra, matrix computing.		

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO					
CLO	1	2	3	4	5	6
1	x					
2		x				
3		x	x			
4			x			

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
1	Introduction to python, colab What is linear structures Introduction to matrix	1		Lecture, Discussion	[1, 2, 3]. Chapter 1
2-3	Fundamentals and geometry of $\mathbb{R}^n$ space Matrix algebra: vectors, matrices. Linear systems, parametric equations and systems of linear equations	1	Exercises	Lecture, In-class exercises	[1, 2, 3]. Chapter 2, 3, 4
4-5	Solving systems of linear equations Subspace of $\mathbb{R}^n$, linear independence, base and dimension in $\mathbb{R}^n$ Python in linear algebra	1, 2	Exercises	Lecture, In-class exercises	[1, 2, 3]. Chapter 4, 5, 6 [4] Chapter 1,2,3
6	Solving linear system with numpy Norm in $\mathbb{R}^n$ with Python	1, 2		Lecture, In-class Discussion	[4]. Chapter 3, 4, 5
7	Abstract vector spaces, base and dimension for abstract vector spaces. Special kinds of matrices and vectors.	1, 2	Exercises	Lecture, In-class exercises	[1, 2, 3]. Chapter 6, 7, 8
8	**Midterm**				
9-10	Span in abstract vector spaces. Fundamentals of linear transformations. Demo of linear transformations in Python.	3, 4	Exercises	Lecture, In-class exercises	[1, 2, 3]. Chapter 8, 9, 10 [4] Chapter 6, 7
11	Linear Transformation in abstract vector space Linear Transformation and Inverses	3	Exercises	Lecture, In-class exercises	[1, 2, 3]. Chapter 10, 11, 12

12	Geometric Transformation of Plane, Image and Kernel, Isomorphism and linear map Isomorphic Vector Spaces	3	Exercises	Lecture, In-class exercises	[1, 2, 3]. Chapter 11, 12, 13
13	Introduction to determinant Determinant expansions. Properties of determinant	3, 4	Quiz	Lecture, In-class Quiz	[1, 2]. Chapter 13. 14, 15
14-15	Elementary Row Operations and the Determinant Eigenvectors and Eigenvalues, Eigen-decompositions Introduction to some application of linear algebra: PCA, OLS, …	3, 4	Exercises	Lecture, In-class exercises	[2, 3]. Chapter 14, 15, 16 [4] Chapter 8, 9, 10
16	Revision			Review-test	
17	**Final exam**				

4. **Assessment plan**

Assessment Type	**CLO1**	**CLO2**	**CLO3**	**CLO4**
Labs (20%)	25%	25%	25%	25%
Midterm examination (30%)	50%	50%		
Projects/Presentations/ Report (10%)			50%	50%
Final examination (40%)		25%	25%	50%

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

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1. When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.↩

5. Rubrics (optional)

5.1. Grading checklist

Grading checklist for Written Reports	
Student: ……..	HW/Assignment:
Date: ……	…….

	Evaluator: ……		
	Max.	**Score**	**Comments**
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)			
TOTAL SCORE	100		

5.2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	**Description**
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described	Issue/ problem to be considered critically is stated, described, and	Issue/ problem to be considered critically is	Issue/ problem to be considered critically is stated without

	comprehensively, delivering all relevant information necessary for full understanding.	clarified so that understanding is not seriously impeded by omissions.	stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	clarification or description.
Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation / evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.

Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**

Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.

Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022

Dean of School of Computer Science and Engineering

Assoc.Prof. Nguyen Van Sinh

Course Name: Algorithms and Data Structure

Course Code: IT013

1. General information

<table>
<tr><td>Course designation</td><td>This subject introduces students to basic data structures and algorithms</td></tr>
<tr><td>Semester(s) in which the course is taught</td><td>4,6</td></tr>
<tr><td>Person responsible for the course</td><td>Dr. Tran Thanh Tung</td></tr>
<tr><td>Language</td><td>English</td></tr>
<tr><td>Relation to curriculum</td><td>Compulsory (All programs)</td></tr>
<tr><td>Teaching methods</td><td>Lecture, lesson, project, seminar.</td></tr>
<tr><td>Workload (incl. contact hours, self-study hours)</td><td>Total workload: 195
Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 45 (lecture) + 30 (laboratory)
Private study including examination preparation, specified in hours: 120</td></tr>
<tr><td>Credit points</td><td>Number of credits : 4
Lecture: 3
Laboratory: 1</td></tr>
<tr><td>Required and recommended prerequisites for joining the course</td><td>Object-Oriented Programming</td></tr>
<tr><td>Course objectives</td><td>Introduction to data structures and algorithms, including their design, analysis, and implementation.</td></tr>
<tr><td>Course learning outcomes</td><td>CLO 1. Understand basic data structures and algorithms
CLO 2. Analyze and evaluate data structures and algorithms.
CLO 3. Design algorithms and select data structures for real world applications.
<table>
<tr><th>Competency level</th><th>Course learning outcome (CLO)</th></tr>
<tr><td>Knowledge</td><td>CLO1</td></tr>
<tr><td>Skill</td><td>CLO2, CLO3</td></tr>
<tr><td>Attitude</td><td>CLO3</td></tr>
</table></td></tr>
<tr><td>Content</td><td>The description of the contents should clearly indicate the weighting of the content and the level.
Weight: lecture session (~~3~~ hours)
Teaching levels: I (Introduce); T (Teach); U (Utilize)
<table>
<tr><th>Topic</th><th>Weight</th><th>Level</th></tr>
<tr><td>Review OOP & Java</td><td>3</td><td>I</td></tr>
<tr><td>Arrays</td><td>3</td><td>T</td></tr>
</table></td></tr>
</table>

		Complexity	3	T	
		Sorting	3	T, U	
		Queue, Stack	3	T	
		List	6	T	
		Recursion	3	T, U	
		Advanced Sorting	6	T	
		Binary Tree	3	T	
		Hash Table	3	T	
		Graphs	3	T	
		Algorithms on graphs	3	T, U	
Examination forms	Short-answer questions				
Study and examination requirements	Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. Assignments/Examination: Students must have more than 50/100 points overall to pass this course.				
Reading list	1. Michael T. Goodrich and Roberto Tamassia, Data Structures and Algorithms in Java 6th, 2014 2. Cormen, Thomas H., et al. Introduction to algorithms. MIT press, 2009. 3. Lafore, Robert. Data structures and algorithms in Java. Sams publishing, 2017.				

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO					
CLO	1	2	3	4	5	6
1	XX					
2		XXX				
3						X

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
1	Review OOP & Java	1	Quiz	Lecture	
2	Arrays	1	Lab, Quiz, Midterm	Lecture, Discussion,	[1,3]

				In class exercises	
3	Complexity	2	Quiz	Lecture, Discussion	[2]
4	Sorting	1,2	Lab, Quiz, Midterm	Lecture, Discussion, In class exercises	[1,3]
5	Queue, Stack	2,3	Lab, Quiz, Midterm	Lecture, Discussion, In class exercises	[1,3]
6	List part 1	1,2	Lab, Quiz, Midterm	Lecture, Discussion, In class exercises	[1,3]
7	List part 2	2,3	Lab, Quiz, Midterm	Lecture, Discussion	
8	Recursion	2,3	Lab, Quiz, Midterm	Lecture, Discussion, In class exercises	[1,3]
9	**Midterm**				
10	Advanced Sorting part 1	1,2	Lab, Quiz, Final	Lecture, Discussion, In class exercises	[1,3]
11	Advanced Sorting part 2	2,3	Lab, Quiz, Final	Lecture, Discussion	[1,2,3]
12	Binary Tree	1,2	Lab, Quiz, Final	Lecture, Discussion, In class exercises	[1,3]
13	Hash Table	2,3	Lab, Quiz, Final	Lecture, Discussion	[1,3]
14	Graphs	1,2	Lab, Quiz, Final	Lecture, Discussion, In class exercises	[2,3]
15	Algorithms on graphs	2,3	Lab, Quiz, Final	Lecture, Discussion	[2,3]
16	**Final exam**				

4. Assessment plan

Assessment Type	**CLO1**	**CLO2**	**CLO3**

Quiz (5%)	20%	5%	
Labs (10%)		10%	
Midterm examination (30%)	40%	30%	30%
Projects/Presentations/ Report (15%)		15%	40%
Final examination (40%)	40%	40%	30%

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

Rubrics (optional)

1. Grading checklist

Grading checklist for Written Reports			
Student: …….. Date: ……	HW/Assignment: ……. Evaluator: ……		
	Max.	**Score**	**Comments**
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)	10		
TOTAL SCORE	100		

2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	**Description**

5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	Issue/ problem to be considered critically is stated without clarification or description.
Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are	Information is taken from source(s) with some interpretation / evaluation, but not enough to develop a coherent analysis or synthesis.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.

	questioned thoroughly.	subject to questioning.	Viewpoints of experts are taken as mostly fact, with little questioning.	
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.

Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the	Language choices are thoughtful and generally support the effectiveness of the presentation.	Language choices are mundane and commonplace and partially support the effectiveness of the	Language choices are unclear and minimally support the effectiveness of the presentation. Language in

	effectiveness of the presentation. Language in presentation is appropriate to audience.	Language in presentation is appropriate to audience.	presentation. Language in presentation is appropriate to audience.	presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.

Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022

Dean of School of Computer Science and Engineering

Assoc.Prof. Nguyen Van Sinh

Course Name: Principles of Database Management

Course Code: IU079

1. General information

Course designation	This course focuses on the design and implementation of database management systems
Semester(s) in which the course is taught	4
Person responsible for the course	Assoc. Prof. Dr. Nguyen Thi Thuy Loan
Language	English
Relation to curriculum	Compulsory (NE, CS,DS)
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	Total workload: 195 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 45 (lecture) + 30 (laboratory) Private study including examination preparation, specified in hours: 120
Credit points	Number of credits: 4 Lecture: 3 Laboratory: 1
Required and recommended prerequisites for joining the course	IT116IU (C Programming)
Course objectives	This subject introduces the students to basic database design and implementation concepts. Database design techniques, including relational design and E-R analysis, are presented. Database queries using SQL are covered in lectures and supported by practical exercises.
Course learning outcomes	CLO 1. Produce an (Extended) Entity-Relationship (E-R) model from specifications. CLO 2. Apply data normalization principles to transforming an ER model into a database schema. CLO 3. Construct efficient SQL queries to retrieve and manipulate data as required.

Competency level	Course learning outcome (CLO)
Knowledge	CLO1
Skill	CLO2, CLO3
Attitude	CLO3

<table>
<tr><td>Content</td><td>The description of the contents should clearly indicate the weighting of the content and the level.
Weight: lecture session (hours)
Teaching levels: I (Introduce); T (Teach); U (Utilize)
<table>
<tr><th>Topic</th><th>Weight</th><th>Level</th></tr>
<tr><td>Introduction to Database Systems</td><td>3</td><td>I</td></tr>
<tr><td>Relational Model and Relational Algebra</td><td>6</td><td>T, U</td></tr>
<tr><td>Structured Query Language</td><td>6</td><td>T, U</td></tr>
<tr><td>(Extended) Entity Relationship Model</td><td>6</td><td>T, U</td></tr>
<tr><td>Relational Database Design</td><td>9</td><td>T, U</td></tr>
<tr><td>Normalization</td><td>6</td><td>T, U</td></tr>
<tr><td>Advanced SQL</td><td>6</td><td>T, U</td></tr>
<tr><td>Review</td><td>3</td><td>I, U</td></tr>
</table></td></tr>
<tr><td>Examination forms</td><td>Multiple-choice questions, short-answer questions</td></tr>
<tr><td>Study and examination requirements</td><td>Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.
Assignments/Examination: Students must have more than 50/100 points overall to pass this course.</td></tr>
<tr><td>Reading list</td><td>1. Abraham Silberschatz, Henry F. Korth, S. Sudarshan, Database System Concept 7th, 2020
2. Jeffrey A. Hoffer, Ramesh Venkataraman, Heikki Topi, Modern Database Management 13th, 2019
3. Ramez Elmasri, Shamkant Navathe, Fundamentals of Database Systems 7th, 2016</td></tr>
</table>

2. Learning Outcomes Matrix (optional)

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO					
CLO	1	2	3	4	5	6
1	XXX					
2		XXX			X	
3		XX			XX	

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
1	Introduction to Database Systems	1	Quiz	Lecture	[1,3]

2	Relational Model and relational Algebra	2	Quiz, Midterm, Project	Lecture, Discussion, In-class, exercise	[1,3]
3	Structured Query Language	3	Quiz, Lab, Project, Midterm	Lecture, Discussion, In-class, exercise	[1,2,3]
4	(Extended) Entity Relationship Model	2	Quiz, Project, Midterm	Lecture, Discussion, In-class, exercise	[1,2,3]
5	**Midterm**				
6	Relational Database Design	2,3	Project, Final, Quiz, Lab	Lecture, Discussion, In-class, exercise	[1,2]
7	Normalization	2,3	Quiz, Project, Final	Lecture, Discussion, In-class, exercise	[2,3]
8	Advanced SQL	3	Quiz, Project, Final	Lecture, Discussion, In-class, exercise	[1,3]
9	Review	2,3	Quiz	Discussion, In-class, exercise	[1,2,3]
10	**Final exam**				

4. Assessment plan

Assessment Type	**CLO1**	**CLO2**	**CLO3**
Labs (10%)		10%	20%
Midterm examination (25%)	40%		20%
Quiz (5%)	10%	20%	
Projects/Presentations/ Report (20%)	30%	20%	30%
Final examination (40%)	20%	50%	30%

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

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1. When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.↩

Rubrics (optional)

1. Grading checklist

Grading checklist for Written Reports	
Student: ……..	HW/Assignment:
Date: ……	…….

	Evaluator: ……		
	Max.	**Score**	**Comments**
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)	10		
TOTAL SCORE	100		

2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	**Description**
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**

Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	Issue/ problem to be considered critically is stated without clarification or description.
Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation / evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts

	presenting a position.		others' assumptions than one's own (or vice versa).	when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	Milestone		Benchmark
	4	3	2	1
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.

	polished and confident.			
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022

Dean of School of Computer Science and Engineering

Assoc.Prof. Nguyen Van Sinh

Course Name: Calculus 2

Course Code: MA003IU

1. General information

Course designation	This course is a continuation of Calculus 1. Its aim to equip student with basis concepts of sequence, series, vector functions, functions of several variables, multiple integrals and their applications
Semester(s) in which the course is taught	1, 2
Person responsible for the course	*Assoc. Prof.Mai Duc Thanh, Assoc. Prof. Tran Vu Khanh, Dr. Nguyen Minh Quan, Dr. Nguyen Anh Tu, Dr. Ta Quoc Bao.*
Language	English
Relation to curriculum	Compulsory
Teaching methods	Lectures, assignments
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: 120 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 60 (lectures) Private study including examination preparation, specified in hours[6]: 60
Credit points	4
Required and recommended prerequisites for joining the course	Calculus 1

[6] When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.

<table>
<tr><td>Course objectives</td><td>4. To provide students with the main ideas and techniques of calculus. These include sequences, series, functions of several variables, optimal problems, multiple integrals, vector calculus.
5. To introduce practical applications of these ideas and techniques, through practical examples taken from many areas of engineering, business, and life sciences.
6. To develop skills in mathematical modelling and problem solving, ability to think logically, and adapt these skills creatively to new situations</td></tr>
<tr><td>Course learning outcomes</td><td>Upon the successful completion of this course students will be able to:
<table>
<tr><th>Competency level</th><th>Course learning outcome (CLO)</th></tr>
<tr><td>Knowledge</td><td>CLO1. Have basic knowledge of series, functions of several variables, mupliple integrals (Program outcomes: a)
CLO2. Have basic knowledge of vector calculus (Program outcomes: a)</td></tr>
<tr><td>Skill</td><td>CLO3. Can compute partial derivatives, multiple integral (Program outcomes: a, j)
CLO4. Can show the convergence of a sequence and a series and u, se power series to simplify computation. Can show the optimal problem using partial derivaties, can find the volume of an object in higher dimension by using the multiple integrals (Program outcomes: i, h)</td></tr>
<tr><td>Attitude</td><td>CLO5. Confident when dealing with partial derivaties, multiple integrals. Comfortable with using partial derivatives and multiple integrals in practical situations. (Program outcome: j, k)</td></tr>
</table></td></tr>
</table>

<table>
<tr><td>Content</td><td>The description of the contents should clearly indicate the weighting of the content and the level.
Weight: lecture session (4 hours)
Teaching levels: I (Introduce); T (Teach); U (Utilize)
<table>
<tr><th>Topic</th><th>Weight</th><th>Level</th></tr>
<tr><td>Sequences and Convergence</td><td>1</td><td>I, T</td></tr>
<tr><td>Series</td><td>1</td><td>I, T</td></tr>
<tr><td>Tests for Convergence</td><td>1</td><td>T, U</td></tr>
<tr><td>Power series</td><td>1</td><td>T, U</td></tr>
<tr><td>Representations of Functions as Power series</td><td>1</td><td>T, U</td></tr>
<tr><td>Taylor and Maclaurin series</td><td>1</td><td>T, U</td></tr>
<tr><td>Vector Functions and Space Curves, Limit and continuity of vector functions</td><td>1</td><td>I, T</td></tr>
<tr><td>Derivatives and Integrals of vector functions, Length of space curves</td><td>1</td><td>T, U</td></tr>
<tr><td>Functions of Several Variables, Limits and Continuity</td><td>1</td><td>I,T</td></tr>
<tr><td>Partial Derivatives, Tangent Plane and Linear Approximations</td><td>1</td><td>T, U</td></tr>
<tr><td>Chain Rules, Directional Derivatives and Gradient</td><td>1</td><td>T, U</td></tr>
<tr><td>Maximum and Minimum Values of Functions of two variables</td><td>1</td><td>T, U</td></tr>
<tr><td>Lagrange Multipliers and Applications</td><td>1</td><td>T, U</td></tr>
<tr><td>Double Integrals in Rectangles, Iterated Integrals</td><td>1</td><td>I, T</td></tr>
<tr><td>Double, Triple Integrals in General regions and Applications</td><td>2</td><td>T,U</td></tr>
</table></td></tr>
<tr><td>Examination forms</td><td>Written examination</td></tr>
<tr><td>Study and examination requirements</td><td>Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.
Assignments/Examination: Students must have more than 50/100 points overall to pass this course.</td></tr>
<tr><td>Reading list</td><td>J. Stewart, Calculus, Thomson Learning, 7th edition, 2012.</td></tr>
</table>

1. Learning Outcomes Matrix (optional)

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	PLO										
CLO	a	b	c	d	e	f	g	h	i	j	k
1	x										
2	x										
3										x	
4										x	
5										x	x

2. Planned learning activities and teaching methods

Week	Topics	CLO	Assessmen	Teaching and Learning activit
1	Sequences, Series, The Integral Test and Estimates Sums, Thecomparison Tests	2, 4	HW	Lectures and Qui
2	Alternating Series, Absolute Convergence and the Ratio and Roots Tests, Strategy for Testing Series	2, 4	HW	Lectures and Qui
3	Power Series, Representations of Functions as Power Series, Taylor & Maclaurin Series, Applications of Taylor Polynomials	4, 5	Quiz	Lectures and Qui
4	3D Coordinate Systems, Vectors, The Dot Product, The Cross Product, Equations of Lines and Planes, Functions of Surface.	2, 4	HW	Lectures and Qui
5	Vector Functions and Space Curves, Derivaties and Integrals of Vector Functions, Arc Length, Parametric Surfaces	4, 5	HW	Lectures and Qui
6	Functions of Several Variables, Limit and Continuty,	2, 4, 5	Quiz	Lectures and Qui
7	Partial Derivatives, Tangent Plances and Linear Approximations,	3, 5	HW	Lectures and Qui
8	Chain Rule, Directional Derivaties and Gradient Vectors,	3, 5	HW	Lectures and Qui

Midterm Exam				
9	Maximun and Minimun Values, Larange Multipliers	2, 4	HW	Lectures and Qui
10	Double Integrals over Rectangles, Iterated Integrals, Double Integrals over General Regions	2, 4	HW	Lectures and Qui
11	Double Integrals in Polar Coordinates, Application of Double Integrals.	4, 5	HW	Lectures and Qui
12	Triple Integrals, Triple Integrals in Cylindrical and Spherial Coordinates. Change of Variables in Multiple Integrals	2, 4	Quiz	Lectures and Qui
13	Vector Fields, Line Integrals, the Fundamental Theorem for Line Integrals	4, 5	HW	Lectures and Qui
14	Green's Theorem, Curl and Divergence, Surface Integrals	2, 4, 5	HW	Lectures and Qui
15	Stokes' Theorem, Divergence Theorem.	1, 2, 3, 4,	Exercises	
Final Exam				

3. Assessment plan

Assessment Type	**CLO1**	**CLO2**	**CLO3**	**CLO4**	**CLO5**
In-class exercises/ quizzes (10%)	Qz1->Qz4 80% Pass	Qz5->Qz8 80%Pass	Qz1->Qz4 80% Pass	Qz5->Qz8 80% Pass	Qz2, 4, 6, 8 70% Pass
Homework exercises (10%)	HW1->H3 70% Pass	HW4, HW5 70%	HW1->HW3 70% Pass	HW4, HW5 70%	HW1->HW5 60% Pass
Midterm exam (30%)	Q1, Q2 80% Pass		Q3, Q4 70% Pass		Q5 50%
Final exam (50%)		Q1, Q2 80%Pass		Q3, Q4 70%Pass	Q5 50%

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

Course Name: Philosophy Marx - Lenin

Course Code: PE015IU

1. Thông tin chung

Tên môn học (tiếng Việt):	Triết học Mác-Lênin
Tên môn học (tiếng Anh):	Philosophy Marx – Lenin
Mã số môn học:	PE015IU
Thuộc khối kiến thức:	Cơ sở
Số tín chỉ:	3
Số tiết lý thuyết:	*30 (trên lớp)*
Số tiết thực hành:	*15 (trên lớp)*
Số tiết tự học:	*90 (về nhà)*
Giảng viên phụ trách	Khoa Chính trị - Hành chính, ĐHQG-HCM

2. Mục đích/mục tiêu môn học (Course Purposes/Aims)

2.1. Môn học trang bị cho sinh viên những nội dung cơ bản về thế giới quan, phương pháp luận triết học Mác - Lênin.

2.2. Giúp cho sinh viên vận dụng những tri thức về thế giới quan, phương pháp luận triết học triết học Mác - Lênin một cách sáng tạo trong hoạt động nhận thức và thực tiễn, nhằm giải quyết những vấn đề mà đời sống xã hội của đất nước, của thời đại đang đặt ra.

3. Mô tả môn học (Course Outlines)

Môn học trang bị cho sinh viên những kiến thức cơ bản về triết học Mác-Lênin

4. Tài liệu phục vụ học tập:

- Bộ Giáo dục và Đào tạo (2019), *Giáo trình Triết học Mác - Lênin,* Nxb. Chính trị quốc gia, Hà Nội.
- Bộ Giáo dục và Đào tạo (2012), *Giáo trình Những Nguyên lý cơ bản của chủ nghĩa Mác - Lênin,* Nxb. Chính trị quốc gia, Hà Nội.
- Hội đồng Trung ương (2008), *Giáo trình Triết học Mác-Lênin,* Nxb. Chính trị quốc gia, Hà Nội.

5. Chuẩn đầu ra môn học (Course Learning Outcomes)

Chuẩn đầu ra	Mô tả	Tiêu chí đánh giá	Mục tiêu môn học	Chuẩn đầu ra CDIO CTĐT	Mức độ giảng dạy (I/T/U)
5.1. Kiến thức					
LO.1	TRIẾT HỌC VÀ VAI TRÒ CỦA TRIẾT HỌC TRONG ĐỜI SỐNG XÃ HỘI	LO. 1.1 - Khái lược được triết học, một số khái niệm cơ bản trong triết học	2.1	1.1.3	I3
		LO. 1.2 - Nhận biết được sự đối lập giữa chủ nghĩa duy vật và chủ nghĩa duy tâm trong việc giải quyết vấn đề cơ bản của triết học			
		LO. 1.3 - Nắm được chủ nghĩa duy vật biện chứng - hình thức phát triển cao nhất của chủ nghĩa duy vật biện chứng			
		LO. 1.4 - Nắm rõ được sự ra đời, đối tượng, chức năng và vai trò của triết học Mác - Lênin			
LO.2	CHỦ NGHĨA DUY VẬT BIỆN CHỨNG	LO.2.1- Hiểu rõ vật chất theo quan điểm của chủ nghĩa duy vật biện chứng	2.1	1.1.3	T4

		LO.2.2 - Hiểu rõ ý thức theo quan điểm của chủ nghĩa duy vật biện chứng	2.1 2.1			
		LO.2.3 - Giải quyết được mối quan hệ giữa vật chất và ý thức theo quan điểm của chủ nghĩa duy vật biện chứng	2.1			
		LO.2.4 - Hiểu được phép biện chứng và phép biện chứng duy vật				
		LO.2.5 - Hiểu rõ được hai nguyên lý cơ bản của phép biện chứng duy vật và rút ra ý nghĩa phương pháp luận của từng nguyên lý	2.1 2.2 2.1 2.2			
		LO.2.6 - Hiểu rõ được các cặp phạm trù cơ bản của phép biện chứng duy vật và rút ra ý nghĩa phương pháp luận từng cặp phạm trù	2.1 2.2 2.1 2.2			
		LO.2.7 - Hiểu rõ được các quy luật cơ bản của cơ bản của phép biện chứng duy vật và rút ra ý nghía phương pháp luận từng quy luật	2.1 2.2			

		LO.2.8 - Hiểu rõ được thực tiễn, nhận thức, vai trò của thực tiễn đối với nhận thức và chân lý	2.1		
LO.3	CHỦ NGHĨA DUY VẬT LỊCH SỬ	LO.3.1 - Nắm được vai trò của sản xuất vật chất và phương thức sản xuất đối với sự tồn tại và phát triển xã hội	2.1 2.2	1.1.3	T4
		LO.3.2 - Hiểu rõ được mối quan hệ biện chứng giữa lực lượng sản xuất và quan hệ sản xuất			
		LO.3.3 - Hiểu rõ được mối quan liệ biện chứng giữa CSHT và KTTT; sự phát triển tự nhiên của các hình thái KT-XH			
		LO.3.4 - Hiểu rõ được giai cấp, đấu tranh giai cấp; dân tộc và mối quan hệ giữa giai cấp, dân tộc và nhân loại			
		LO.3.5 - Hiểu rõ được nhà nước và mạng xã hội			
		LO.3.6 - Hiểu rõ dược mối quan lệ biện chứng giữa tồn tại xã hội và ý thức xã hội			
		LO.3.7 - Hiểu rõ được con người bản chất con người; hiện tượng tha hóa và giải phóng con người mối quan hệ giữa cá nhân và xã hội, vai trò của quần chúng nhân dân			
5.2. Kỹ năng					
LO.4	THỂ HIỆN KHẢ NĂNG KHÁI QUÁT HÓA, TƯ DUY, TRANH LUẬN, PHẢN BIỆN, LÀM VIỆC NHÓM	LO.4.1. Có kỹ năng khái quát hóa để rút ra *Từ khóa tri thức* đối với mỗi nội dung và tư duy có hệ thống LO.4.2. Có kỹ năng trình bày, thuyết minh, phản biện, tranh luận, hùng biện những tri thức lý luận đang học tập, nghiên cứu	2.1 2.2	2.1.1 2.3.1 2.4.4 2.5	U4

5.3. Thái độ					
LO.5	THỂ HIỆN Ý THỨC, NHẬN THỨC TRONG VÀ SAU KHI HỌC TẬP	LO.5.1. Có ý thức trách nhiệm bảo vệ tính khoa học, cách mạng, nhân văn của CN Mác - Lênin LO.5.2. Có ý thức, trách nhiệm cá nhân đối với tập thể, cộng đồng	2.1 2.2	3.1	U3
		dựa trên thực tiễn LO.4.3. Có kỹ năng giao tiếp xã bội, hợp tác và làm việc nhóm, chia sẻ tri thức và kinh nghiệm, khả năng điều hành nhóm làm việc		3.1.5	

6. Kế hoạch giảng dạy theo buổi học (Course Plan):

TT (Tiết)	Nội dung giảng dạy	LO	Hoạt động dạy và học	Đánh giá
1 (1 tiết)	**Giới thiệu về môn học**	LO.l, LO.4;	**Dạy:** - Giới thiệu đề cương môn học - Giới thiệu nội dung đề tài thuyết trình nhóm GHW) **Học ở lớp:** - Chia nhóm (5 sv/nhóm) - Giới thiệu nhóm học tập **Học ngoài lớp:** -Chọn đề tài thuyết trình của nhóm (GHW) Đọc trước tài liệu chương 1.	
2 (15 tiết)	**Chương 1** TRIẾT HỌC VÀ VAI TRÒ	LO.l; LO.4 LO.5	**Dạy:** **1.** TRIẾT HỌC VÀ VẤN ĐỀ CƠ BẢN CỦA TRIẾT HỌC 1. Khái lược về triết học 2. Vấn đề cơ bản của triết học 3. Biện chứng và siêu hình	Thi giữa kỳ (Quiz)

	CỦA TRIẾT HỌC TRONG ĐỜI SỐNG XÃ HỘI		II. TRIẾT HỌC MÁC - LÊNIN VÀ VAI TRÒ CỦA TRIẾT HỌC MÁC - LÊNIN TRONG ĐỜI SỐNG XÃ HỘI 1. Sự ra đời và phát triển của triết học Mác - Lênin 2. Đối tượng và chức năng của triết học Mác - Lênin 3. Vai trò của triết học Mác - Lênin trong đời sống xã hội và trong sự nghiệp đổi mới ở Việt Nam hiện nay **Học ở lớp:** Thảo luận và phát biểu trên lớp **Học ngoài lớp:** - Phác thảo nội dung thuyết trình nhóm GHW Đọc trước tài liệu chương 2.	
3 (15 tiết)	**Chương 2** CHỦ NGHĨA DUY VẬT BIỆN CHỨNG	LO.2 LO.4 LO.5	**Dạy:** I. VẬT CHẤT VÀ Ý THỨC 1. Vật chất và các hình thức tồn tại của vật chất 2. Nguồn gốc, bản chất và kết cấu của ý thức 3. Mối quan hệ giữa vật chất và ý thức II. PHÉP BIỆN CHỨNG DUY VẬT 1. Hai loại hình biện chứng và phép biện chứng duy vật Nội dung của phép biện chứng duy vật III. LÝ LUẬN NHẬN THỨC 1. Các nguyên tắc của lý luận nhận thức duy vật biện chứng 2. Nguồn gốc, bản chất của nhận thức 3. Thực tiễn và vai trò của thực tiễn đối với nhận thức 4. Các giai đoạn cơ bản của quá trình nhận thức Chân lý **Học ở Lớp:** Thảo luận và phát biểu trên lớp **Học ngoài lớp:** Đọc trước tài liệu chương 3	Thi giữa kỳ (Quiz) Thi cuối kỳ (FEX)
4 (14 tiết)	**Chương 3** CHỦ NGHĨA DUY VẬT LỊCH SỬ	L0.3 L0.4 L0.5	**Dạy:** I. HỌC THUYẾT HÌNH THÁI KINH TẾ - XÃ HỘI 1. Sản xuất vật chất là cơ sở của sự tồn tại và phát triển xã hội 2. Biện chứng giữa lực lượng sản xuất và quan hệ sản xuất 3. Biện chứng giữa cơ sở hạ tầng và kiến trúc	Thuyết trình nhóm (GHW) Thi cuối kỳ (FEX)

			thượng tầng của xã hội 4. Sự phát triển các hình thái kinh tế - xã hội là một quá trình lịch sử - tự nhiên II. GIAI CẤP VÀ DÂN TỘC 160 1. Vấn đề giai cấp và đấu tranh giai cấp 2. Dân tộc 3. Mối quan hệ giai cấp - dân tộc - nhân loại III. NHÀ NƯỚC VÀ CÁCH MẠNG XÃ HỘI 1. Nhà nước 2. Cách mạng xã hội IV. Ý THỨC XÃ HỘI 1. Khái niệm tồn tại xã hội và các yếu tố cơ bản của tồn tại xã hội 2. Ý thức xã hội và kết cấu của ý thức xã hội V. TRIẾT HỌC VỀ CON NGƯỜI 1. Khái niệm con người và bàn chất con người 2. Hiện tượng tha hóa con người và vấn đề giải phóng con người 3. Quan hệ cá nhân và xã hội; vai trò của quần chúng nhân dân và lãnh tụ trong lịch sử Vấn đề con người trong sự nghiệp cách mạng ở Việt Nam **Học ở lớp:** Thảo luận và phát biểu trên lớp **Học ngoài lớp:** Hoàn thiện bài thuyết trình	

7. Đánh giá môn học

STT	Mã	Tên	Mô tả	Tỷ trọng	Hình thức	LO
1	GHW	Thuyết trình nhóm	Thuyết trình nhóm về đề tài đã phân công	15%	Thuyết trình và bản báo cáo nhóm	LO.2 LO.3 LO.4 LO.5
2	Quiz	Bài thi giữa kỳ	Thi theo đề thi chung	20%	Tự luận đề mở	LO.l LO.2;

3	Die	Thảo luận, chuyên cần tại lớp (Discussion in Class)	Điểm thảo luận được tính theo phương pháp tương đối. sv có số lần thảo luận tại lớp nhiều nhất sẽ được điểm tối đa, điểm của các bạn khác được tính dựa theo bạn có số lần thảo luận cao nhất.	15%	Phát biểu/đặt câu hỏi trên lớp hoặc phiếu trả lời trong các nghiên cứu tình huống tại lớp	LO.4 LO.5
4	FEX	Thi cuối kỳ	Đề thi bao quát toàn bộ nội dung môn học	50%	Tự luận đề đóng	LO.2; LO.3; LO.4;
			Tổng cộng	**100%**		

8. Tiêu chí đánh giá chuẩn đầu ra môn học

TT	Chuẩn đầu ra	Nội dung	Phương pháp	Tiêu chí đánh giá
LO.l	Nhận biết được sự đối lập giữa chủ nghĩa duy vật và chủ nghĩa duy tâm trong việc giải quyết vấn đề cơ bản của triết học; vai trò của triết học Mác – Lênin	Chương 1	Thi giữa kỳ (Quiz)	Ngân hàng đề thi của GV
LO.2 LO.4	Nắm rõ nội dung: Vật chất, ý thức và mối quan hệ giữa chúng; các nguyên lý, các quy luật và các phạm trù cơ bản của phép biện chứng duy vật	Chương 2	Thuyết trình nhóm (GHW) Thi cuối kỳ (FEX)	Tiêu chí đánh giá thuyết trình nhóm Ngân hàng đề thi của GV
LO.3 LO.4	Nhận biết và nắm được nội dung của chủ nghĩa duy vật lịch sử	Chương 3	Thảo luận tại lớp (Discussion in Class) Thi cuối kỳ (FEX)	Tiêu chí đánh giá thuyết trình nhóm, thảo luận tại lớp Ngân hàng đề thi của GV

9. Một số lưu ý khác:

- Khi có các thắc mắc liên quan môn học, sinh viên có thể liên lạc với quản lý Bộ môn Hồ Chí Minh học và Lịch sử Đảng và Khoa Chính trị - Hành chính qua email: daotao.spas@vnuhcm.edu.vn
- Quy định về Bài thuyết trình nhóm GHW

Thành lập nhóm: 5 sinh viên/nhóm. Hạn chót đăng ký đề tài nhóm Quản lý trên forum là Buổi 2 hoặc trực tiếp nộp cho GV buổi 1.

Tuần 4 (buổi thứ 4) thuyết trình theo thứ tự. Lưu ý các nhóm cần có mặt đủ và mang theo tất cả các tài liệu liên quan đến GHW khi đi thuyết trình.

Hình thức nộp bài: Nộp file và biên bản làm việc nhóm qua mail cho GV

- Quy định về giờ giấc, chuyên cần, kỷ luật trong khóa học: Lên lớp đúng giờ, dự tối thiểu 80% thời gian học trên lớp (chỉ được phép vắng mặt tối đa 20% số tiết học). Nếu vắng quá số tiết quy định sẽ bị cấm thi theo quy chế. Có đầy đủ điểm kiểm tra, điểm thi kết thúc học phần & nhiệt tình thảo luận, phát biểu xây dựng bài, nghiêm túc trong giờ học.

Course Name: Computer Architecture

Course Code: IT089

1. **General information**

Course designation	This course introduces the principles of computer organization and the basic computer architecture.
Semester(s) in which the course is taught	4
Person responsible for the course	Dr. Le Hai Duong
Language	English
Relation to curriculum	Compulsory (CS, NE, CE)
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: 195 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 45 (lecture) + 30 (laboratory) Private study including examination preparation, specified in hours: 120 Student responsibility: Students are expected to spend at least 8 hours per week for self – studying. This time should be made up of reading, working on exercises and problems and group assignment.
Credit points	Number of credits : 4 Lecture: 3 Laboratory: 1
Required and recommended prerequisites for joining the course	Digital Logic Design
Course objectives	This course provides students the principles of computer architecture and organization. It covers the subjects on assembly language and machine code, computer arithmetic and ALU design, computer performance, datapath and control, pipelining, memory hierarchy, I/O devices, multi-processor architectures, and mobile and multi-core processors.
Course learning outcomes	CLO 1. Understand the principles of computer architecture and the interfaces between its hardware and software components; CLO 2. Understand computer arithmetic (both integer and floating point), datapath, control , pipelining, pipeline hazards and their remedies, computer buses and I/O peripherals, and multiprocessor architecture;

<table>
<tr><td></td><td>CLO 3. Create assembly programs and their machine code equivalent;
CLO 4. Analyze the performance of computer;
CLO 5. Analyze computer memory and its organization, especially the interaction between cache and main memory.
<table>
<tr><th>Competency level</th><th>Course learning outcome (CLO)</th></tr>
<tr><td>Knowledge</td><td>CLO1, CLO2</td></tr>
<tr><td>Skill</td><td>CLO3, CLO4, CLO5</td></tr>
<tr><td>Attitude</td><td></td></tr>
</table></td></tr>
<tr><td>Content</td><td>The description of the contents should clearly indicate the weighting of the content and the level.
Weight: lecture session (~~3~~ hours)
Teaching levels: I (Introduce); T (Teach); U (Utilize)
<table>
<tr><th>Topic</th><th>Weight</th><th>Level</th></tr>
<tr><td>History of computers, relations of software and hardware components;</td><td>1</td><td>I</td></tr>
<tr><td>Assembly language instructions</td><td>5</td><td>T, U</td></tr>
<tr><td>Computer arithmetic principles and hardware design</td><td>1</td><td>T</td></tr>
<tr><td>Computer performance</td><td>1</td><td>T,U</td></tr>
<tr><td>Datapath and its control</td><td>2</td><td>T</td></tr>
<tr><td>Microprocessor pipelining</td><td>2</td><td>T, U</td></tr>
<tr><td>Memory hierarchy</td><td>1</td><td>T</td></tr>
<tr><td>I/O devices and buses</td><td>1</td><td>T</td></tr>
<tr><td>Multiprocessor</td><td>1</td><td>T</td></tr>
</table></td></tr>
<tr><td>Examination forms</td><td>Multiple-choice questions, short-answer questions</td></tr>
<tr><td>Study and examination requirements</td><td>Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.
Assignments/Examination: Students must have more than 50/100 points overall to pass this course.</td></tr>
<tr><td>Reading list</td><td>1. David A. Patterson and John L. Hennessy, Computer Organization and Design 5th, 2013</td></tr>
</table>

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-5) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO					
CLO	1	2	3	4	5	6
1	X					

2	X					
3		X				X
4	X					
5	X					

3. **Planned learning activities and teaching methods**

Week	Topic	CLO	Assessments	Learning activities	Resources
1	History of computers, relations of software and hardware components;	1	Quiz, exam	Lecture	[1]
2	Assembly language instructions	3	Quiz, exam	Lecture, lab, exercises	[1]
3	Computer arithmetic principles and hardware design	2	Quiz, exam	Lecture, exercises	[1]
4	**Midterm**				
5	Computer performance	4	Quiz, exam	Lecture, exercises	[1]
6	Datapath and its control	1, 2	Quiz, exam	Lecture, exercises	[1]
7	Microprocessor pipelining		Quiz, exam	Lecture, exercises	[1]
8	Memory hierarchy	5	Quiz, exam	Lecture, exercises	[1]
9	I/O devices and buses	2	Quiz, exam	Lecture, exercises	[1]
10	Multiprocessor	2	Quiz, exam	Lecture, exercises	[1]
11	**Final exam**				

1. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4	CLO5
Midterm examination (30%)	70%	70%	25%		
Final examination (40%)			50%	70%	70%
Exercises/ Quiz (30%)	30%	30%	25%	30%	30%

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

1. When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual

questions to lecturers after the class, all mean that about 60 minutes should be counted.

1. Rubrics (optional)

5.1. Grading checklist

Grading checklist for Written Reports			
Student: …….. Date: ……	HW/Assignment: ……. Evaluator: ……		
	Max.	**Score**	**Comments**
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)	10		
TOTAL SCORE	100		

5.2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	**Description**
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	Milestone		Benchmark
	4	**3**	**2**	**1**
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	Issue/ problem to be considered critically is stated without clarification or description.
Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation / evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.

Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's	Conclusion is logically tied to a range of information, including opposing viewpoints; related	Conclusion is logically tied to information (because information is chosen to fit the	Conclusion is inconsistently tied to some of the information discussed; related outcomes

	informed evaluation and ability to place evidence and perspectives discussed in priority order.	outcomes (consequences and implications) are identified clearly.	desired conclusion); some related outcomes (consequences and implications) are identified clearly.	(consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.

Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable,	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

	and strongly supported.)			

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022

Dean of School of Computer Science and Engineering

Assoc.Prof. Nguyen Van Sinh

Course Name: Computer Networks

Course Code: IT091IU

1. General information

Course designation	This subject covers the fundamental knowledge of computer networks
Semester(s) in which the course is taught	3,5
Person responsible for the course	Assoc. Prof. Vo Thi Luu Phuong.
Language	English
Relation to curriculum	Compulsory (CS, NE, CE)
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: 195 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 45 (lecture) + 30 (laboratory) Private study including examination preparation, specified in hours: 120
Credit points	Number of credits: 4 Lecture: 3 Laboratory: 1
Required and recommended prerequisites for joining the course	C/C++ Programming or Fundamentals of Programming
Course objectives	This course covers the fundamental knowledge of computer networks such as OSI, TCP/IP models, network architectures, LAN, WAN, the typical network protocols. The students will also study to design, implement and monitor a small / medium scale network.
Course learning outcomes	CLO 1. Analyze the components, architecture, and protocols in computer networks; CLO 2. Apply the theory in designing a small/medium computer networks; CLO 3. Show the ability to work in teams;

Competency level	**Course learning outcome (CLO)**
Knowledge	CLO1
Skill	CLO2, CLO3
Attitude	CLO2

<table>
<tr><td>Content</td><td>The description of the contents should clearly indicate the weighting of the content and the level.
Weight: lecture session (3 hours)
Teaching levels: I (Introduce); T (Teach); U (Utilize)
<table>
<tr><th>Topic</th><th>Weight</th><th>Level</th></tr>
<tr><td>Introduction of computer networks</td><td>2</td><td>T, U</td></tr>
<tr><td>Network applications: HTTP, FTP, DNS, SMTP</td><td>2</td><td>T, U</td></tr>
<tr><td>Transport layer: congestion control, TCP, UDP</td><td>2</td><td>T, U</td></tr>
<tr><td>IP addressing, CIDR, VLSM</td><td>2</td><td>T, U</td></tr>
<tr><td>Network layer: routing algorithms, routing protocols</td><td>2</td><td>T, U</td></tr>
<tr><td>Datalink layer and physical layer</td><td>2</td><td>T, U</td></tr>
<tr><td>Wireless and mobile networks</td><td>2</td><td>T</td></tr>
<tr><td>Some advanced topics in contemporary networks</td><td>1</td><td>U</td></tr>
</table></td></tr>
<tr><td>Examination forms</td><td>Multiple-choice questions, short-answer questions</td></tr>
<tr><td>Study and examination requirements</td><td>Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.
Assignments/Examination: Students must have more than 50/100 points overall to pass this course.</td></tr>
<tr><td>Reading list</td><td>1. J. F. Kurose and K. W. Ross, Computer Networking: A Top Down Approach 7th, 2014</td></tr>
</table>

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-3) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO					
CLO	1	2	3	4	5	6
1	✓✓					
2		✓✓✓				
3					✓	

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
1-2	Introduction of computer networks	1	Midterm	lecture	Chapter 1, [1]

3-4	Network applications: HTTP, FTP, DNS, SMTP	1	Midterm, Lab	lecture, lab	Chapter 2, [1]
5-6	Transport layer: congestion control, TCP, UDP	1	Midterm, Lab	lecture, lab	Chapter 3, [1]
	Midterm				
7-8	IP addressing, CIDR, VLSM	2	Final, Lab	lecture, lab	Chapter 4, [1]
9-10	Network layer: routing algorithms, routing protocols	1,2	Final, Lab	lecture, lab	Chapter 5, [1]
11-12	Datalink layer and physical layer	1,2	Final, Lab	lecture, lab	Chapter 6, [1]
13-14	Wireless and mobile networks	1	Final	lecture	Chapter 7, [1]
15	Some advanced topics in contemporary networks	3	Group project	group work	Literature
10	**Final exam**				

4. Assessment plan

Assessment Type	**CLO1**	**CLO2**	**CLO3**
Exercises, quizzes, attendants (10%)	30%		30%
Group project (5%)		30%	40%
Labs (25%)		30%	30%
Midterm examination (30%)	40%		
Final examination (30%)	30%	40%	

1. When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.↩

5. Rubrics (optional)

5.1. Grading checklist

Grading checklist for Written Reports			
Student: …….. Date: ……	HW/Assignment: ……. Evaluator: ……		
	Max.	**Score**	**Comments**
Technical content (60%)			

Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)	10		
TOTAL SCORE	100		

5.2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	**Description**
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously	Issue/ problem to be considered critically is stated but description leaves some	Issue/ problem to be considered critically is stated without clarification or description.

	information necessary for full understanding.	impeded by omissions.	terms undefined, ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	
Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation / evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.

Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**

Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.

Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022

Dean of School of Computer Science and Engineering

Assoc.Prof. Nguyen Van Sinh

Course Name: Web Application Development

Course Code: IT093

1. **General information**

Course designation	This subject introduces to students the development of web application. How to design and program a web-app in practice based on the tools, techniques and web frameworks
Semester(s) in which the course is taught	6
Person responsible for the course	Assoc. Prof. Nguyen Van Sinh
Language	English
Relation to curriculum	Compulsory (NE, CE, CS)
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	Total workload: 195 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 45 (lecture) + 30 (laboratory) Private study including examination preparation, specified in hours: 120
Credit points	Number of credits : 4 Lecture: 3 Laboratory: 1
Required and recommended prerequisites for joining the course	Object-Oriented Programming Principles of Database Management
Course objectives	This course provides students the fundamentals of web design and web programming. It provide the concepts and models of HTML, Java Server Page, Java Bean, MVC model, Java utilities and development environments, extended Java frameworks, several new frameworks with different programming languages. To develop skills in understanding and evaluating web-based systems, as well as to develop skills in designing and developing web-based applications.
Course learning outcomes	CLO 1. Understand web design, web programming concepts and models. CLO 2. Apply to design and develop static/dynamic web application with HTML, Java Server Pages, Java Bean, extended Java and other frameworks based on the MVC model. CLO 3. Apply knowledge and ability to manage and use Java, XML utilities and IDE for developing web applications with DBMS.

<table>
<tr><td></td><td>CLO 4: work in group, communication, interaction and responsible within a team.

<table>
<tr><th>Competency level</th><th>Course learning outcome (CLO)</th></tr>
<tr><td>Knowledge</td><td>CLO1</td></tr>
<tr><td>Skill</td><td>CLO2, CLO3</td></tr>
<tr><td>Attitude</td><td>CLO4</td></tr>
</table></td></tr>
<tr><td>Content</td><td>The description of the contents should clearly indicate the weighting of the content and the level.
Weight: lecture session (3 teaching hours)
Teaching levels: I (Introduce); T (Teach); U (Utilize)
<table>
<tr><th>Topic</th><th>Weight</th><th>Level</th></tr>
<tr><td>Week 1: Introduction to the course and HTML</td><td>3</td><td>I,T</td></tr>
<tr><td>Week 2: Advanced HTML and CSS</td><td>3</td><td>I,T,U</td></tr>
<tr><td>Week 3: Introduction to J2EE and new frameworks in web application</td><td>3</td><td>I,T</td></tr>
<tr><td>Week 4 : Servlet</td><td>3</td><td>I,T,U</td></tr>
<tr><td>Week 5: Java server page and JDBC</td><td>3</td><td>I,T,U</td></tr>
<tr><td>Week 6: Java Bean and MVC</td><td>3</td><td>I,T,U</td></tr>
<tr><td>Week 7: Web state, session, cookies & midterm review</td><td>3</td><td>I,T,U</td></tr>
<tr><td>Week 8: Java Script, APIs and Libraries</td><td>3</td><td>I,T,U</td></tr>
<tr><td>Week 9&10: Node JS Framework</td><td>3</td><td>I,T,U</td></tr>
<tr><td>Week 11: Graphical models on the webpage, web multimedia and web 360</td><td>3</td><td>I,T,U</td></tr>
<tr><td>Week 12&13: XML & XSLT</td><td>3</td><td>I,T,U</td></tr>
<tr><td>Week 14: Ajax framework</td><td>3</td><td>I,T,U</td></tr>
<tr><td>Week 15: the existing web frameworks & final review</td><td>3</td><td>I,T,U</td></tr>
</table></td></tr>
<tr><td>Examination forms</td><td>Multiple-choice questions, short-answer questions and programming</td></tr>
<tr><td>Study and examination requirements</td><td>Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.
Assignments/Examination: Students must have more than 50/100 points overall to pass this course.</td></tr>
<tr><td>Reading list</td><td>1. Dave Wolf and A.J. Henley. “Java EE Web Application Primer Building Bullhorn: A Messaging App with JSP, Servlets, JavaScript, Bootstrap and Oracle”, 2017.</td></tr>
</table>

	2. Prem Kumar Karunakaran. "Java Web Application Development", second edition, 2020. **3.** Laura Ubelhor and Christian Hur. "Developing Business Application for the Web With HTML, CSS, JSP, PHP, ASP.NET and JavaScript", 2017. **4.** *Refer VN book: N.V.Sinh, N.T.T.Sang, T.M.Hà* "Xây dựng ứng dụng Web cho Thương mại điện tử trên Netbeans", Nhà xuất bản Xây dựng 2017

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO					
CLO	1	2	3	4	5	6
1	X	X				
2		X				
3		X				X
4					X	

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
1	Introduction to the course and HTML	1	Quiz	Lecture,	[1,2]
2	Advanced HTML and CSS	2,3,4	Quiz, Lab, Midterm exam	Lecture, Discussion, In-class exercises	[1,2,3]
3	Introduction to J2EE and new frameworks in web application	1	Quiz, Midterm	Lecture, Discussion	[1,2]
4	Servlet	2,3,4	Quiz, Lab, Midterm exam	Lecture, Discussion, In-class exercises	[1,2,3,4]
5	Java server page and JDBC	2,3,4	Quiz, Lab, Midterm exam	Lecture, Discussion, In-class exercises	[1,2,3,4]
6	Java Bean and MVC	2,3,4	Quiz, Lab, Midterm exam	Lecture, Discussion, In-class exercises	[1,2,3,4]

7	Web state, session, cookies & midterm review	2,3,4	Quiz, Lab, Midterm exam	Lecture, Discussion, In-class exercises	[1,2,3,4]
8	Java Script, APIs and Libraries & midterm review	2,3,4	Quiz, Lab, Midterm exam	Lecture, Discussion, In-class exercises	[1,2,3,4]
9	Node JS Framework	2,3	Quiz, Lab	Lecture, Discussion, In-class exercises	[1,2,3,4]
10	Node JS Framework (continue)	2,3	Quiz, Lab	Lecture, Discussion, In-class exercises	[1,2,3,4]
11	Graphical models on the webpage, web multimedia and web 360	2,3,4	Quiz, Lab, Final exam	Lecture, Discussion, In-class exercises	[1,2,3,4]
12	XML & XSLT	2,3,4	Quiz, Lab, Final exam	Lecture, Discussion, In-class exercises	[1,2,3,4]
13	XML & XSLT (continue)	2,3,4	Quiz, Lab, Final exam	Lecture, Discussion, In-class exercises	[1,2,3,4]
14	Ajax framework	2,3	Quiz, Lab	Lecture, Discussion, In-class exercises	[1,2,3,4]
15	Existing web frameworks & final review	2,3	Quiz, Lab, Final exam	Lecture, Discussion, In-class exercises	[1,2,3,4]
16	**Final exam**				

4. **Assessment plan**

Assessment Type	**CLO1**	**CLO2**	**CLO3**	**CLO4**
Labs (20%)		30%	40%	30%
Midterm examination (30%)	40$	60%		
Exercises/Quiz (10%)	30%	40%	30%	
Final examination (40%)		50%	50%	

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics (optional)

5.1. Grading checklist

Grading checklist for Written Reports			
Student: …….. Date: ……	HW/Assignment: ……. Evaluator: ……		
	Max.	**Score**	**Comments**
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)	10		
TOTAL SCORE	100		

5.2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	**Description**
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**

Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	Issue/ problem to be considered critically is stated without clarification or description.
Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation / evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts

	presenting a position.		others' assumptions than one's own (or vice versa).	when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	Milestone		Benchmark
	4	3	2	1
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.

	polished and confident.			
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022

Dean of School of Computer Science and Engineering

Assoc.Prof. Nguyen Van Sinh

Course Name: Probability, Statistics and Random Process

Course Code: MA026IU

1. General information

Course designation	*The course is aimed to provide the beginning students in engineering with the simple concepts and techniques of probabilistic and statistics models and stochastic processes.*
Semester(s) in which the course is taught	1, 2, 3
Person responsible for the course	Dr. Ta Quoc Bao Dr. Pham Hai Ha
Language	English
Relation to curriculum	Compulsory
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: 135 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 45 Private study including examination preparation, specified in hours: 90
Credit points	3
Required and recommended prerequisites for joining the course	Calculus 1 and Calculus 2
Course objectives	Students will be provided with skills of using data from a variety of sources, be introduced to contemporary computing and database environments, such as R/Python, and be exposed to case studies from outside the classroom. Through this unit, students will become acquainted with the challenges of contemporary data science and gain an appreciation of the foundational skills necessary to turn data into information.

<table>
<tr><td>Course learning outcomes</td><td>Upon the successful completion of this course students will be able to:
<table>
<tr><th>Competency level</th><th>Course learning outcome (CLO)</th></tr>
<tr><td>Knowledge</td><td>CLO1. Identify basic concept such as sample space, events, probability, conditional probability, independence; distribution and mean, variance of random variables; important statistics including sample mean, sample proportion, sample variance and sample standard deviation.</td></tr>
<tr><td>Skill</td><td>CLO2. Compute probability of simple and complicated events with probability rules; Evaluate probability, mean and variance of random variables and function of random variables.
CLO3. Conduct estimate parameter(s) and hypothesis testing procedure from sample data.
CLO4. Calculate transition probability, unconditional distribution, classify state and find stationary distribution of a Markov chain.</td></tr>
</table></td></tr>
<tr><td>Content</td><td>The description of the contents should clearly indicate the weighting of the content and the level.
Weight: lecture session (3 hours)
Teaching levels: I (Introduce); T (Teach); U (Utilize)
<table>
<tr><th>Topic</th><th>Weight</th><th>Level</th></tr>
<tr><td>Introduction to Probability</td><td>1</td><td>I, T</td></tr>
<tr><td>Counting techniques</td><td>1</td><td>T, U</td></tr>
<tr><td>Conditional probability and probability rules</td><td>2</td><td>T, U</td></tr>
<tr><td>Random variables and mathematical expectation</td><td>4</td><td>T, U</td></tr>
<tr><td>Markov chain</td><td>2</td><td>T, U</td></tr>
<tr><td>Introduction to Statistics and Statistics Descriptive</td><td>1</td><td>I, T</td></tr>
<tr><td>Parameter estimation</td><td>2</td><td>T, U</td></tr>
</table></td></tr>
</table>

	Hypothesis testing	**2**	**T, U**
Examination forms	Written examination		
Study and examination requirements	Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. Assignments/Examination: Students must have more than 50/100 points overall to pass this course.		
Reading list	1. R. Walpole et al, *Probability and Statistics for Engineers and Scientists*, 9th edition. 2. S. Ross, *Introduction to Probability Models*, 9th edition. 3. S. Ross, *Introduction Probability and Statistics for Engineers and Scientist*, 3th edition		

2. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
1	Introduction to probability	1	Quiz1	Lecture, HW	[1].1 [2].2 [3].3
2	Counting techniques	2		Lecture, HW	[1].2
3 - 4	Calculating probability	2	Quiz2	Lecture HW	[1].2 [2].1 [3].3

5-6	Random variables	2	Quiz3	Lecture, HW	[1].3, [2].2, 3 [3].4
7	Mean – Variance – Covariance	2	HW1	Lecture, Discussion, HW	[1].4 [2].2 [3].4
8	Special distributions	2		Lecture, HW	[1].5, 6 [2].2 [3].5
9	Midterm				
10 -11	Markov chain	4	HW2	Lecture, Discussion, HW	[2].4
12	Descriptive statistics	1		Lecture, Discussion, HW	[1]. 1. [3].2
13 - 14	Parameter estimation	3	Quiz4	Lecture, Discussion, HW	[1]. 9 [3].7
15 - 16	Hypothesis testing	3	Quiz5	Lecture, Discussion, HW	[1]. 10 [3]. 8
17	Final exam				

3. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
In-class exercises/quizzes (10%)	Qz1 70%Pass	Qz2, Qz3 70%Pass	Qz3, Qz4 70% Pass	
Homework exercises (10%)	HW1 70%Pass			HW2 70%Pass
Midterm exam (30%)	Part I 70%Pass	Part II 70%Pass		
Final exam (50%)			Part II 70%Pass	Part I 70%Pass

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

4. Date revised: January 12, 2022

Course Name: Marxist - Leninist Political Economy

Course Code: PE016IU

1. Thông tin chung

Tên môn học (tiếng Việt):	Kinh tế chính trị Mác-Lênin
Tên môn học (tiếng Anh);	Marxist - Leninist Political Economy
Mã số môn học:	PE016IU
Thuộc khối kiến thức:	Cơ sở
Số tín chì:	02
Số tiết lý thuyết:	*20 (trên lớp)*
số tiết thực hành:	*10 (trên lớp)*
Số tiết tự học:	*60 (về nhà)*
Môn học song hành:	1. Triết học Mác - Lênin
Giảng viên phụ trách:	Khoa Chính trị - Hành chính, ĐHQG-HCM

Mục đích/mục tiêu môn học (Course Purposes/Aims)

2.1. Một là, trang bị cho sinh viên những kiến thức cơ bản, cốt lõi của Kinh tế chính trị Mác - Lênin trong bối cảnh phát triển kinh tế của đất nước và thế giới ngày nay. Đảm bảo tính cơ bản, hệ thống, khoa học, cập nhật tri thức mới, gắn với thực tiễn, tính sáng tạo, kỹ năng, tư duy, phẩm chất người học, tính liên thông khắc phục trùng lặp, tăng cường tích hợp và giảm tải, lược bớt những nội dung không còn phù hợp hoặc những nội dung mang tính kinh viện đối với sinh viên các trường Cao đẳng, Đại học không chuyến lý luận.

2.2. Hai là, trên cơ sở đó hình thành tư duy, kỹ năng phân tích, đánh giá và nhận diện bản chất của các quan hệ lợi ích kinh tế trong phát triển kinh tể - xã hội của đất nước góp phần giúp sinh viên xây dựng trách nhiệm xã hội phù hợp trong vị trí việc làm và cuộc sống sau khi ra trường.

2.3. Ba là, góp phần xây dựng lập trường, ý thức hệ tư tưởng Mác - Lê nin đối với sinh viên.

2. **Mô tả môn học** (Course Outlines)

Nội dung chương trình gồm 6 chương: Trong đó chương 1 bàn về đối tượng, phương pháp nghiên cứu và chức năng của Kinh tế chính trị Mác - Lênin. Từ chương 2 đến chương 6 trình bày nội dung cốt lõi của Kinh tế chính trị Mác - Lê nin theo mục tiêu của

môn học. Cụ thể các vấn đề như: Hàng hóa, thị trường và vai trò của các chủ thể trong nền kinh tế thị trường; Sản xuất giá trị thặng dư trong nền kinh tế thị trường; Cạnh tranh và độc quyền trong nền kinh tế thị trường; Kinh tế thị trường định hướng xã hội chủ nghĩa và các quan hệ lợi ích kinh tế ở Việt Nam; Công nghiệp hóa, hiện đại hóa và hội nhập kinh tế quốc tế ở Việt Nam.

3. Tài liệu phục vụ học tập:

- Tài liệu bắt buộc: Giáo trình kinh tế chính trị Mác - Lê nin dành cho bậc đại học không chuyên kinh tế chính trị.
- Tài liệu đọc thêm:

+ Robert, JR và Robert F. Hebert (2003), Lịch sử các học thuyết kinh tế, Bản tiếng Việt, Nxb Thống kê.

+ Viện Kinh tế chính trị học, Học viện Chính trị quốc gia Hồ Chí Minh (2018), Giáo trình Kinh tế chính trị Mác - Lê nin, NXB Lý luận Chính trị.

+ Các. Mác - Ph. Ăng gen: Toàn tập, tập 20, tập 23, tập 25, Nxb Chính trị quốc gia, 1994.

+ V.LLê nin toàn cập, tập 3, tập 27, NXB Tiến bộ Maxcơva, 1976.

+ Davig Begg, Stanley Fisher, Rudiger Dornbusch, Kinh tế học, Nhà xuất bản Giáo dục Hà Nội 1992.

+ Đảng Cộng sản Việt Nam (2016), Vãn kiện Đại hội Đại biểu toàn quốc lần thứ XII, Nxb Chính trị quốc gia, Hà Nội.

+ Đảng Cộng sản Việt Nam (2016), Báo cáo tổng kết một số van đề lý luận - thực tiễn qua ba mươi năm đổi mới (1986 - 2016), NXB Chính trị quốc gia, Hà Nội.

+ Đảng Cộng sản Việt Nam (2017), Nghị quyết số 11-NQ/TW ngày 03/6/2017 về: "Hoàn thiện thế chế kinh tể thị trường định hướng xã hội chủ nghĩa"

+ Chỉ thị số 16/CT-TTg (2017) "về việc tăng cường năng lực tiếp cận cuộc cách mạng công nghiệp lần thứ 4".

+ Jeremy Rifkin (2014), Cuộc cách mạng công nghiệp lần thứ ba, bản dịch tiếng Việt, NXB Lao động xã hội.

+ Manfred B. Steger (2011), Toàn cầu hóa, Nxb Tri thức.

+ Klaus Schwab (2015): Cách mạng công nghiệp lần thứ tư, Nxb Chính trị quốc gia - Sự thật, 2018.

4. **Chuẩn đầu ra môn học** (Course Learning Outcomes)

Chuẩn đầu ra	Mô tả	Tiêu chí đánh giá	Mục tiêu môn học	Chuẩn đầu ra CDIO CTĐT	Mức độ giảng dạy (I/T/U)
5.*1. Kiến thức*					
LO.1	ĐỐI TƯỢNG, PHƯƠNG PHÁP NGHIÊN CỨU VÀ CHỨC NĂNG CỦA KINH TẾ CHÍNH TRỊ MÁC - LÊNIN	LO. 1.1 -Nắm được sự hình thành và phát triển của Kinh tế chính trị Mác – Lênin	2.1		I3
		LO. 1.2 - Xác dinh được đối tượng nghiên cứu của kinh tế chính trị Mác - Lênin.			
		LO. 1.3 - Hiểu rõ được phương pháp nghiên cứu cùa kinh tể chính trị Mác- Lênin			
		LO. 1.4 - Hiểu rõ các chức năng của môn học kinh tế chính trị Mác - Lênin.			
LO.2	HÀNG HÓA, THỊ TRƯỜNG VÀ VAI TRÒ CỦA CÁC CHỦ THỂ THAM GIA THỊ TRƯỜNG.	LO.2.1- Hiểu rõ sản xuất hàng hóa và điều kiện ra đời của sản xuất hàng hóa	2.1		T4
		LO.2.2 - Hiểu rõ hàng hóa, hai thuộc tính của hàng hóa và mối quan hệ giữa hai thuộc tính			
		LO.2.3 - Hiểu rõ mối quan hệ giữa tính hai mặt của lao động sản xuất hàng hóa với hai thuộc tính của hàng hóa			
		LO.2.4 - Hiểu rõ mặt chất và lượng của giá trị hàng hóa và các nhân tố ảnh hưởng đến lượng giá trị hàng hóa			
		LO.2.5 - Hiểu rõ được nguồn gốc, bản chất và chức năng của tiền tệ.			
		LO.2.6 - Hiểu rõ về thị trường, vai trò của thị trường, cơ chế thị trường và nền kinh tế thị trường.			

		LO.2.7 - Hiểu rõ được một số quy luật kinh tế chủ yếu của kinh tế thị trường.			
		LO.2.8 - Hiểu rõ vai trò của các chủ thể tham gia thị trường.			
LO.3	GIÁ TRỊ THẶNG DƯ TRONG NỀN KINH TẾ THỊ TRƯỜNG	LO.3.1 - Hiểu rõ được tư bản là gì, công thức chung của tư bản và mâu thuẫn công thức chung của tư bản.	2.1		T4
		LO.3.2 - Hiểu rõ được hàng hóa sức lao động là gì, tại sao nghiên cứu hàng hóa sức lao động giải quyết mâu thuẫn công thức chung của tư bản	2.1 2.1 2.3 2.3		
		LO.3.3 - Hiểu rõ được giá trị thặng dư là gì. Xác định được có mấy phương pháp sản xuất giá trị thặng dư.	2.1		
		LO.3.4 - Hiểu rõ được bản chất của tích lũy tư bản, nhưng nhân tố làm tăng quy mô tích lũy tư bản và hệ quả của tích lũy tư bản.	2.1 2.1		
		LO.3.5 - Hiểu rõ được các khái niệm: chi phí sản xuất, lợi nhuận, tỷ suất lợi nhuận, lợi nhuận bình quân, lợi nhuận thương nghiệp, các nhân tố ảnh hưởng đến tỷ suất lợi nhuận	2.3		
		LO.3.6 - Hiểu rõ được lợi tức là gì.			
		LO.3.7 - Hiểu rõ được địa tô tư bản chủ nghĩa. Có mấy loại địa tô tư bản chủ nghĩa và giá cả ruộng đất.			
LO.4	CẠNH TRANH VÀ ĐỘC QUYỀN TRONG NỀN KINH TẾ THỊ TRƯỜNG	LO.4.1 - Hiểu rõ được quan hệ giữa cạnh tranh và độc quyền trong nền kinh tế thị trường.	2.1		
		LO.4.2 - Hiểu rõ được nguyên nhân hình thành độc quyền trong nền kinh tế thị trường.	2.1		

		LO.4.3 - Hiểu rõ được những đặc điểm kinh tế cơ bản của độc quyền trong chủ nghĩa tư bản theo quan điểm của V.I. Lênin	2.1		
		LO.4.4 - Hiểu rõ được nguyên nhân hình thành và phát triển của chủ nghĩa tư bản độc quyền nhà nước.	2.1		

		LO.4.5 - Hiểu rõ được bản chất của chủ nghĩa tư bản độc quyền nhà nước và những biểu hiện chủ yếu của độc quyền nhà nước trong chủ nghĩa tư bản.	2.3		
		LO.4.6 - Nắm được vai trò lịch sử của chủ nghĩa tư bản.	2.1		
LO.5	KINH TẾ THỊ TRƯỜNG ĐỊNH HƯỚNG XÃ HỘI CHỦ NGHĨA VÀ CÁC QUAN HỆ LỢI ÍCH KINH TẾ Ở VIỆT NAM	LO.5.1 - Hiểu rõ dược khái niệm kinh tế thị trường định hướng xã hội chủ nghĩa ở Việt Nam	2.1		T4
		LO.5.2 - Hiểu rõ được tính tất yếu khách quan của việc phát triển kinh tế thị trường định hướng xã hội chủ nghĩa ở Việt Nam	2.1		
		LO.5.3 - Nắm được những đặc trưng của kinh tế thị trường định hướng xã hội chủ nghĩa ở Việt Nam.	2.1		
		LO.5.4 - Hiểu rõ thể chế kinh tế thị trường định hướng xã hội chủ nghĩa là gì và sự cần thiết phải hoàn thiện nó.	2.1		
		LO.5.5 - Nắm được những nội dung cơ bản của hoàn thiện thể chế kinh tế thị trường định hướng xã hội chủ nghĩa ở Việt Nam	2.1		
		LO.5.6 - Hiểu rõ được khái niệm lợi ích kinh tế và quan hệ lợi ích kinh tế	2.2		
		LO.5.7 -Hiểu rõ được vai trò của nhà nước trong đảm bảo hài hòa các quan hệ lợi ích	2.1		
O.6	CÔNG NGHIỆP HÓA, HIỆN ĐẠI HÓA VÀ HỘI NHẬP KINH TẾ QUỐC TẾ CỦA VIỆT NAM	LO.6.1 - Hiểu rõ được cách mạng công nghiệp là gi, khái quát được các cuộc cách mạng đã diễn ra trong lịch sử.	2.1		T4
		LO.6.2 - Hiểu rõ vai trò của cách mạng công nghiệp đối với sự phát triển	2.1		

		LO.6.3 - Hiểu được công nghiệp hóa là gì và các mô hình công nghiệp hóa tiêu biểu trên thế giới.	2.1		
		LO.6.4 - Hiểu rõ tính tất yếu khách quan của công nghiệp hóa, hiện đại hóa ở Việt Nam.	2.1		
		LO.6.5 - Nắm được những nội dung của công nghiệp hóa, hiện đại hóa ở Việt Nam	2.1		
		LO.6.6 - Nắm được công nghiệp hóa, hiện đại hóa ở Việt Nam trong bối cảnh của cuộc cách mạng công nghiệp lần thứ 4.	2.3		
		LO.6.7 - Hiểu rõ được hội nhập kinh tế quốc tế là gì. Vì sao hội nhập kinh tế quốc tế là sự cần thiết khách quan.	2.1		

		LO.6.8 - Nắm được những nội dung và tác động tích cực và tiêu cực của hội nhập kinh tể quốc tế.	2.3		
		LO.6.9 - Nắm được phương hướng nâng cao hiệu quả hội nhập kinh tế quốc tế trong phát triển của Việt Nam	2.3		
5.2. Kỹ năng					
L0.7	THỂ HIỆN KHẢ NĂNG KHÁI QUÁT HÓA, TƯ DUY, TRANH LUẬN, PHẢN BIỆN, LÀM VIỆC NHÓM	LO.7.1. Có kỹ năng khái quát hóa để rút ra *Từ khóa tri thức* đối với mỗi nội dung và tư duy có hệ thống	2.1		U4
		LO.7.2. Có kỹ năng trình bày, thuyết minh, phản biện, tranh luận, hùng biện những tri thức lý luận đang học tập, nghiên cứu dựa trên thực tiễn	2.2		
		LO.7.3. Có kỹ năng giao tiếp xã hội, hợp tác và làm việc nhóm, chia sẻ tri thức và kinh nghiệm, khả năng điều hành nhóm làm việc	2.4		
5.3. Thái độ					
LO.8	THỂ HIỆN Ý THỨC, NHẬN THÚC TRONG VÀ SAU KHI HỌC TẬP	LO.8.1. Có ý thức trách nhiệm bảo vệ tính khoa học, cách mạng, nhân văn của CN Mác - Lênin	2.1		U3
		LO.8.2. Có ý thức, trách nhiệm cá nhân đối vối tập thể, cộng đồng	2.2		
		LO.8.3. Có nhận thức về sự cần thiết học tập, nghiên cứu suốt đời và vận dụng nó trong đời sống.	2.3		

6. Kế hoạch giảng dạy theo buổi học (Course Plan):

TT	Nội dung giảng dạy	LO	Hoạt động dạy và học	Đánh giá

1 (1 tiết)	Giới thiệu về môn học	LO.l, LO.7;	**Dạy:** - Tự giới thiệu về giảng viên - Giới thiệu đề cương và tài liệu môn học - Hướng dẫn cách thức dạy và học và cách đánh giá. - Giới thiệu nội dung đề tài thuyết trình nhóm GHW) **Học ở lớp:** - Chia nhóm (5 sv/nhóm) - Giới thiệu nhóm học tập **Học ngoài lớp:** -Chọn đề tài thuyết trình của nhóm (GHW) - Dọc trước tài liệu chương 1.	
2 (2 tiết)	**Chương I** ĐỐI TƯỢNG, PHƯƠNG PHÁP NGHIÊN CỨU VÀ CHỨC NĂNG CÙA KINH TẾ CHÍNH TRỊ MÁC - LÊNIN	LO.l; LO.7 LO.8	**Dạy:** I. SỰ HÌNH THÀNH VÀ PHÁT TRIỂN CỦA KTCT MÁC - LENIN 1.Giai đoạn từ cổ đại dển thế kỷ 18 2.Giai đoạn từ sau thế kỷ 18 đến nay II. ĐỐI TƯỢNG, PHƯƠNG PHÁP NGHIÊN CỨU CỦA KINH TẾ CHÍNH TRỊ MÁC - LÊN1N. 1.Đối tượng nghiên cứu 2.Phương pháp nghiên cứu 3.Mục đích nghiên cứu III. CHỨC NĂNG CỦA KINH TẾ CHÍNH TRỊ MÁC - LÊNIN. 1.Chức năng nhận thức 2.Chức năng thực tiễn 3.Chức năng tư tưởng 4.Chức năng phương pháp luận **Học ở lớp:** Thảo luận và phát biểu trên lớp. **Học ngoài lớp:** - Phác thảo nội dung thuyết trình nhóm GHW - Đọc trước tài liệu chương 2.	Thi giữa kỳ (Quiz)

3 (6 tiết)	**Chương 2** HÀNG HÓA, THỊ TRƯỜNG VA VAI TRÒ CỦA CÁC CHỦ THỂ THAM GIA THỊ TRƯỜNG.	LO.2 LO.7 LO.8	**Dạy:** I. LÝ LUẬN CỦA CÁC MÁC VỀ SẢN XUẤT HÀNG HÓA VÀ HÀNG HÓA. **2.**Sản xuất hàng hỏa -Khái niệm sản xuất hàng hóa - Điều kiện ra đời của sản xuất hàng hóa. **3.**Hàng hóa - Khái niệm hàng hóa - Hai thuộc tính của hàng hóa - Lượng giá trị và các nhân tố ảnh hưởng đến lượng giá trị của hàng hóa - Tính hai mặt của lao động sản xuất hàng hóa. **4.**Tiền - Nguồn gốc và bản chất của tiền - Chức năng của tiền **5.**Dịch vụ và một số hàng hóa đặc biệt. II. THỊ TRƯỜNG VÀ VAI TRÒ CỦA CÁC CHỦ THỂ THAM GIA THỊ TRƯỜNG. 1.Thị trường - Khái niệm về thị trường - Vai trò của thị trường. - Cơ chế thị trường - Nền kinh tế thị trường. 2.Vai trò của các chủ thể tham gia thị trường. - Người sản xuất. - Người tiêu dùng. - Các chủ thể trung gian trong thị trường. - Nhà nước. **Học ở lớp:** Thảo luận và phát biểu trên lớp **Học ngoài lớp:** Đọc trước tài liệu chương 3.	Thi giữa kỳ (Quiz) Thi cuối kỳ (FEX)

4 (6 tiết)	**Chương 3** GIÁ TRỊ THẶNG DƯ TRONG NỀN KINH TẾ THỊ TRƯỜNG	LO.3 LO.7 LO.8	**Dạy:** I.LÝ LUẬN CỦA CÁC MÁC VỀ GIÁ TRỊ THẶNG DƯ 1.Nguồn gốc của giá trị thặng dư 2.Bản chất của giá trị thặng dư 3.Các phương pháp sản xuất giá trị thặng dư trong nền kinh tế thị trường tư bản chủ nghĩa. II.TÍCH LŨY TƯ BẢN -Bản chất của tích lũy -Những nhân tố góp phần làm tăng quy mô tích lũy -Một số hệ quả của tích lũy tư bản III.CÁC HÌNH THỨC BIỂU HIỆN GIÁ TRỊ THẶNG DƯ TRONG NỀN KINH TẾ THỊ TRƯỜNG 1.Lợi nhuận 2.Lợi tức 3.Địa tô tư bản chủ nghĩa **Học ở lớp:** Thảo luận và phát biểu trên lớp **Học ngoài lớp**: Hoàn thiện bài thuyết trình Đọc trước tài liệu chương 4	Thuyết trình nhóm (GHW) Thi cuối kỳ (FEX)
5 (5 tiết)	**Chương 4** CẠNH TRANH VÀ ĐỘC QUYỀN TRONG NỀN KINH TẾ THỊ TRƯỜNG	LO.4 LO.7 LO.8	**Dạy:** I. QUAN HỆ GIỮA CẠNH TRANH VÀ ĐỘC QUYỀN TRONG NN KINH TẾ THỊ TRƯỜNG. II. ĐỘC QUYỀN VÀ ĐỘC QUYỀN NHÀ NƯỚC TRONG NỀN KỈNH TẾ THỊ TRƯỜNG. 1.Lý luận của V.I. Lênin về độc quyền trong nên kinh tế thị trường. - Nguyên nhân hình thành và tác động của độc quyền. - Những đặc điểm kinh tế cơ bản của độc quyền trong chủ nghĩa tư bản 2.Lý luận của V.I. Lê nin về độc quyền nhà nước trong chủ nghĩa tư bản. - Nguyên nhân ra đời và phát triển của độc quyền nhà nước trong chủ nghĩa tư bản. - Bản chất của độc quyền nhà nước trong chủ nghĩa tư bản. - Những biểu hiện chủ yếu của độc quyền nhà nước trong chủ nghĩa tư bản. - Vai trò lịch sử của chủ nghĩa tư bản. - **Học ở lớp:** Thảo luận và phát biểu trên lớp - **Học ngoài lớp:** Đọc trước tài liệu chương 5	Thuyết trình nhóm (GHW) Thi cuối kỳ (FEX)

6 (5 tiết)	**Chương 5** KINH TẾ THỊ TRƯỜNG ĐỊNH HƯỚNG XÃ HỘI CHỦ NGHĨA VÀ CÁC QUAN HỆ LỢI ÍCH KINH TẾ Ở VIỆT NAM	LO.5 LO.7 LO.8	**Dạy:** I. KINH TẾ THỊ TRƯỜNG ĐỊNH HƯỚNG XÃ HỘI CHỦ NGHĨA Ở VIỆT NAM **2.** Khái niệm kinh tế thị trường định hướng xã hội chủ nghĩa ở Việt Nam **3.** Tính tất yếu khách quan của việc phát triển kinh tế thị trường định hướng xã hội chủ nghĩa ở Việt Nam. **4.** Đặc trưng của kinh tế thị trường định hướng xã hội chủ nghĩa ở Việt Nam.	Thuyết trình nhóm (GHW) Thi cuối kỳ (FEX)

6 (5 tiết)	**Chương 5** KINH TẾ THỊ TRƯỜNG ĐỊNH HƯỚNG XÃ HỘI CHỦ NGHĨA VÀ CÁC QUAN HỆ LỢI ÍCH KINH TẾ Ở VIỆT NAM	LO.5 LO.7 LO.8	II. HOÀN THIỆN THỂ CHẾ KINH TẾ THỊ TRƯỜNG ĐỊNH HƯỚNG XÃ HỘI CHỦ NGHĨA Ở VIỆT NAM. 1.Sự cần thiết phải hoàn thiện thể chế kinh tế thị trường định hướng xã hội chủ nghĩa ở Việt Nam 2.Hoàn thiện thể chế kinh tế thị trường định hướng xã hội chủ nghĩa ở Việt Nam một số khía cạnh chủ yếu. III. CÁC QUAN HỆ LỢI ÍCH KINH TẾ Ở VIỆT NAM Lợi ích kinh tế và quan hệ lợi ích kinh tế. 1.Vai trò của nhà nước trong đảm bảo hài hòa các quan hệ lợi ích Học ở lớp: Thảo luận và phát biểu trên lớp Học ngoài lớp: Hoàn thiện bài thuyết trình	Thuyết trình nhóm (GHW) Thi cuối kỳ (FEX)

7. Đánh giá môn học

STT	Mã	Tên	Mô tả	Tỷ trọng	Hình thức	LO
1	GHW	Thuyết trình nhóm	Thuyết trình nhóm về đề tài đã phân công	15%	Thuyết trình và bản báo cáo nhóm	LO.4 LO 5 LO6 LO.7 LO.8
2	Quiz	Bài thi giữa kỳ	Thi theo đề thi chung	20%	Tự luận đề mở	LO.2 LO.3

3	DIC	Thảo luận, chuyên cần tại lớp (Discussion in Class)	Điểm thảo luận được tính theo phương pháp tương đối. sv có số lần thảo luận tại lớp nhiều nhất sẽ được điểm tối đa, điểm của các bạn khác dược tính dựa	15%	Phát biểu/đặt câu hỏi trên lớp hoặc phiếu trả lời trong các nghiên cứu tình huống tại	LO.7 LO.8
4	FEX	Thi cuối kỳ	Đề thi bao quát toàn bộ nội dung môn học	50%	Tự luận đề đóng	LO.2 LO.3 LO.4 LO.5 LO.6 LO.7 LO.8
			Tổng cộng	**100%**		

8. Tiêu chí đánh giá chuẩn đầu ra môn học

TT	Chuẩn đầu ra	Nội dung	Phương pháp	Tiêu chí đánh giá
LO.l	Nhận biết được vị trí của Kinh tế chính trị Mác - Lênin trong hệ thống lịch sử tư tưởng kinh tế và nắm được đối tượng, phương pháp và chức năng của kinh tế chính trị Mác - Lênin.	Chương 1	Thỉ giữa kỳ (Quiz)	Ngân hàng đề thi của GV
LO.2 LO.7	Nắm rõ nội dung: sản xuất hàng hóa, điều kiện ra đời của sản xuất hàng hóa, khái niệm hàng hóa và hai thuộc tính của hàng hóa, chất và lượng của giá trị hàng hóa, mối quan hệ giữa tính hai mặt của lao động sản xuất hàng hóa với hai thuộc tính của hàng hóa, các nhân tố ảnh hưởng đến lượng giá trị của hàng hóa, nguồn gốc ra đời, bản chất và chức năng của tiền. Thị trường, cơ chế thị trường, nền kinh tế thị trường và vai trò các chủ thế tham gia thị trường	Chương 2	Thuyết trình nhóm (GHW) Thi cuối kỳ (FEX)	Tiêu chí đánh giá thuyết trình nhóm Ngân hàng đề thi của GV

LO.3 LO.7	Hiểu rõ và nắm được những nội dung: tư bản là gì? Công thức chung và mâu thuẫn công thức chung của tư bản. Hàng hóa sức lao động và tính chất đặc biệt của giá trị sử dụng hàng hóa sức lao động. Giá trị thặng dư và hai phương pháp sản xuất giá trị thặng dư. Tích lũy tư bản và những nhân tố làm tăng quy mô tích lũy. Các khái niệm về chi phí sản xuất, lợi nhuận, lợi tức và địa tô tư bản chủ nghĩa	Chương 3	Thảo luận tại lớp (Discussion in Class) Thi cuối kỳ (FEX)	Tiêu chí đánh giá thuyết trình nhóm, thảo luận tại lớp Ngân hàng đề thi của GV
LO.4 LO.7	Hiểu rõ và nắm được những nội dung: quan hệ giữa cạnh tranh và độc quyền trong nền kinh tế thị trường. Tổ chức độc quyền là gì? Nguyên nhân hình thành các tổ chức độc quyền. Những đặc điểm kinh tế cơ bản của độc quyền theo quan điểm của V.I. Lênin. Lý luận về độc quyền nhà nước trong chủ nghĩa tư bản. Vai trò lịch sử của chủ nghĩa tư bản.	Chương 4	Thảo luận tại lớp (Discussion in Class) Thi cuối kỳ (FEX)	Tiêu chí đánh giá thuyết trình nhóm, thảo luận tại lớp Ngân hàng đề thi của GV
LO.5 LO.7	Hiểu rõ và nắm được những nội dung: kinh tế thị trường định hướng xã hội chủ nghĩa ở Việt Nam, những đặc trưng của kinh tế thị trường định hướng xã hội chủ nghĩa. Thể chế kinh tế thị trường định hướng xã hội chủ nghĩa và sự cần thiết phải hoàn thiện thể chế kinh tế thị trường định hướng xã hội chủ nghĩa. Lợi ích kinh tế và quan hệ lợi ích kinh tế. Vai trò của nhà nước trong đảm bảo hài hòa các quan hệ lợi ích.	Chương 5	Thảo luận tại lớp (Discussion in class) Thi cuối kỳ (FEX)	Tiêu chí đánh giá thuyết trình nhóm, thảo luận tại lớp Ngân hàng đề thi của GV

LO.6 LO.7	Hiểu rõ và nắm được những nội dung: cách mạng công nghiệp là gì? Vai trò của cách mạng công nghiệp đối với sự phát triển. Công nghiệp hóa là gì? Các mô hình công nghiệp hóa tiêu biểu trên thế giới. Công nghiệp hóa, hiện đại hóa ở Việt Nam là gì. Tính tất yếu khách quan phải công nghiệp hóa, hiện đại hóa ở Việt Nam. Công nghiệp hóa, hiện đại hóa ở Việt Nam trong bối cảnh cuộc cách mạng công nghiệp lần thứ 4. Hội nhập kinh tế quốc tế là gì, sự cần thiết khách quan phải hội nhập kinh tế quốc tế. Tác động của hội nhập kinh tế quốc tế của Việt Nam. Phương hướng nâng cao hiệu quả hội nhập kinh tế quốc tế.	Chương 6	Thảo luận tại lớp (Discussion in class) Thi cuối kỳ (FEX)	Tiêu chí đánh giá thuyết trình nhóm, thảo luận tại lớp Ngân hàng đề thi của GV

9. Một số lưu ý khác

- Khi có các thắc mắc liên quan môn học, sinh viên có thể liên lạc với giảng viên qua email: lethong0804@gmail.com
- Quy định về Bài thuyết trình nhóm GHW
- Thành lập nhóm: 5 sinh viên/nhóm. Hạn chót đăng ký đề tài nhóm Quản lý trên forum là Buổi 2 hoặc trực tiếp nộp cho GV buổi ỉ.
- Tuần 4 (buổi thú' 4) thuyết trình theo thứ tự. Lưu ý các nhóm cần có mặt đủ và mang theo tất cả các tài liệu liên quan đến GHW khi đi thuyết trình.
- Hình thức nộp bài: Nộp file và biên bản làm việc nhóm qua mail cho GV
- Quy định về giờ giấc, chuyên cần, kỷ luật trong khóa học: Lên lớp đúng giờ, dự tối thiểu 80% thời gian học trên lớp (chỉ được phép vắng mặt tối đa 20% số tiết học). Nếu vắng quá số tiết quy định sẽ bị cấm thi theo quy chế. Có đầy đủ điểm kiểm tra, điểm thi kết thúc học phần & nhiệt tình thảo luận, phát biểu xây dựng bài, nghiêm túc trong giờ học.

Course Name: Operating Systems

Course Code: IT017IU

1. General information

Course designation	This course covers fundamental concepts of operating systems including scheduling, virtual memory and file systems.
Semester(s) in which the course is taught	5,7
Person responsible for the course	Dr. Le Hai Duong
Language	English
Relation to curriculum	Compulsory (NE, CE, CS)
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: 195 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 45 (lecture) + 30 (laboratory) Private study including examination preparation, specified in hours: 120 Student responsibility: Students are expected to spend at least 8 hours per week for self – studying. This time should be made up of reading, working on exercises and problems and group assignment.
Credit points	Number of credits : 4 Lecture: 3 Laboratory: 1
Required and recommended prerequisites for joining the course	Algorithms and Data Structure Computer Architecture
Course objectives	This course presents the theory, design, implementation, and analysis of computer operating systems. Through classroom lectures, labs, projects and exercises, students learn the fundamentals of concurrency and process management, inter-process communication and synchronization, memory management, job scheduling algorithms, input/output management, file systems, security in operating systems. Course labs use the C/C++ language and include the design and implementation of portions of an operating system.
Course learning outcomes	CLO 1. Understand processes and process management CLO 2. Understand synchronization and communication CLO 3. Understand memory management

<table>
<tr><td></td><td>CLO 4. Given a scheduling algorithm, determine timeline of actions
CLO 5. Understand internals of file system
CLO 6. Design and implement portions of an operating system
<table>
<tr><th>Competency level</th><th>Course learning outcome (CLO)</th></tr>
<tr><td>Knowledge</td><td>CLO1, CLO2, CLO3, CLO4, CLO5</td></tr>
<tr><td>Skill</td><td>CLO6</td></tr>
<tr><td>Attitude</td><td></td></tr>
</table></td></tr>
<tr><td>Content</td><td>The description of the contents should clearly indicate the weighting of the content and the level.
Weight: lecture session (~~3~~ hours)
Teaching levels: I (Introduce); T (Teach); U (Utilize)
<table>
<tr><th>Topic</th><th>Weight</th><th>Level</th></tr>
<tr><td>Introduction, processes, process management</td><td>2</td><td>T</td></tr>
<tr><td>Threads</td><td>2</td><td>T,U</td></tr>
<tr><td>Inter-process communication (IPC) and synchronization, deadlocks</td><td>1</td><td>T</td></tr>
<tr><td>Memory management</td><td>2</td><td>T</td></tr>
<tr><td>process scheduling</td><td>2</td><td>T</td></tr>
<tr><td>Input/output and disk management</td><td>1</td><td>T</td></tr>
<tr><td>File systems</td><td>2</td><td>T,U</td></tr>
<tr><td>Security in operating systems</td><td>1</td><td>T,U</td></tr>
<tr><td>Embedded operating systems</td><td>1</td><td>T</td></tr>
<tr><td>Distributed system issues</td><td>1</td><td>T</td></tr>
</table></td></tr>
<tr><td>Examination forms</td><td>Multiple-choice questions, short-answer questions</td></tr>
<tr><td>Study and examination requirements</td><td>Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.
Assignments/Examination: Students must have more than 50/100 points overall to pass this course.</td></tr>
<tr><td>Reading list</td><td>1. W. Stallin, Operating Systems: Internals and design principles 7th, 2011
2. A.S. Tanenbaum, Modern Operating Systems 3rd, 2008</td></tr>
</table>

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-6) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO

CLO	1	2	3	4	5	6
1	X					
2	X					
3	X					
4		X				
5	X					
6		X				

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
1	Introduction, processes, process management	1	Quiz, exam	Lecture, exercises, lab	[1], [2]
2	Threads	1	Quiz, exam	Lecture, exercises, lab	[1], [2]
3	Inter-process communication (IPC) and synchronization, deadlocks	2	Quiz, exam	Lecture, exercises, lab	[1], [2]
4	Memory management	3	Quiz, exam	Lecture, exercises, lab	[1], [2]
5	**Midterm**				
6	process scheduling	4	Quiz, exam	Lecture, exercises, lab	[1], [2]
7	Input/output and disk management	5	Quiz, exam	Lecture, exercises, lab	[1], [2]
8	File systems	5	Quiz, exam	Lecture, exercises, lab	[1], [2]
9	Security in operating systems	6	Quiz, exam	Lecture, exercises, lab	[1], [2]
10	Embedded operating systems	6	Quiz, exam	Lecture, exercises, lab	[1], [2]
11	Distributed system issues	6	Quiz, exam	Lecture, exercises, lab	[1], [2]
12	**Final exam**				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4	CLO5	CLO6
Midterm examination (30%)	10%	10%	10%			
Projects/Presentations/ Report (20%)	3%	3%		4%		10%
Final examination (40%)			18%	17%	15%	
Exercises/ Quiz (10%)	2%	2%	2%	2%	2%	

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

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1. When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.↩

5. Rubrics (optional)

5.1. Grading checklist

Grading checklist for Written Reports			
Student: …….. Date: ……	HW/Assignment: ……. Evaluator: ……		
	Max.	**Score**	**Comments**
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)	10		
TOTAL SCORE	100		

5.2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW

Score	Description
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	Issue/ problem to be considered critically is stated without clarification or description.
Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are	Information is taken from source(s) with some interpretation / evaluation, but not enough to develop a coherent analysis or synthesis.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.

	questioned thoroughly.	subject to questioning.	Viewpoints of experts are taken as mostly fact, with little questioning.	
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.

Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the	Language choices are thoughtful and generally support the effectiveness of the presentation.	Language choices are mundane and commonplace and partially support the effectiveness of the	Language choices are unclear and minimally support the effectiveness of the presentation. Language in

	effectiveness of the presentation. Language in presentation is appropriate to audience.	Language in presentation is appropriate to audience.	presentation. Language in presentation is appropriate to audience.	presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.

Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022

Dean of School of Computer Science and Engineering

Assoc.Prof. Nguyen Van Sinh

Course Name: Net-centric Programming

Course Code: IT096IU

1. General information

Course designation	Advanced programming course with focus on developing network application
Semester(s) in which the course is taught	6
Person responsible for the course	MSc. Le Thanh Son
Language	English
Relation to curriculum	Compulsory (NE) Elective (CS)
Teaching methods	Lecture
Workload (incl. contact hours, self-study hours)	Total workload: 195 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 45 (lecture) + 30 (laboratory) Private study including examination preparation, specified in hours: 120
Credit points	Number of credits : 4 Lecture: 2 Laboratory: 1 Mini project: 1
Required and recommended prerequisites for joining the course	Computer Networks
Course objectives	Advanced programming with a focus on developing software for networked systems using UNIX as a reference platform. Topics: Socket Programming using TCP and UDP, Network Application development using popular Internet protocols such as HTTP, FTP... Completing the mini project will help students gain a deeper understanding of current trends of Network Applications in the industry.
Course learning outcomes	CLO 1. Understand the structure of network applications CLO 2. Able to develop network applications using TCP and UDP sockets CLO 3. Understand and implement network applications using popular Internet protocols CLO 4. Team working

Competency level	**Course learning outcome (CLO)**
Knowledge	1, 2, 3
Skill	2, 3
Attitude	4

Content	*The description of the contents should clearly indicate the weighting of the content and the level.* Weight: lecture session (~~3~~ hours) Teaching levels: I (Introduce); T (Teach); U (Utilize)

Topic	**Weight**	**Level**
Network revisions	3	I
TCP Socket Programming	3	T, U
UDP Socket Programming	3	T, U
Data Serialization	3	T, U
Application Protocols	3	T, U
HTTP services	3	T, U
Working with Databases	3	T, U
Working with Cloud services	3	T, U
Web Scrapping	3	T, U
Web Socket	3	T, U
Network applications in the industry	12	T, U
Mini Project Presentation	3	U

Examination forms	Multiple-choice questions, short-answer questions
Study and examination requirements	Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. Assignments/Examination: Students must have more than 50/100 points overall to pass this course.
Reading list	1. Michael J.Donahoo, Kenneth L.Calvert, TCP/IP Socket in C: A Practical Guide for Programmers 2nd, 2009 2. W. R. Stevens, B. Fenner, A. M. Rudoff, Unix Network Programming, Vol. 1: The Sockets Networking API 3rd, 2003 3. Brandon Rhodes, Foundations of Python Network Programming 3rd, 2014

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

CLO\SLO	1	2	3	4	5	6
1	x					
2		xx				
3		xxx				
4						x

3. Planned learning activities and teaching methods

Week	**Topic**	**CLO**	**Assessments**	**Learning activities**	**Resources**
1	Network revisions	1	Homework	Lecture	2
2	TCP Socket Programming	2	Homework	Lecture,	1, 2

				Discussion, Quiz	
3	UDP Socket Programming	2	Homework	Lecture, Discussion, Quiz	1, 2
4	Data Serialization	2	Homework	Lecture, Discussion, Quiz	2, 3
5	Application Protocols	2	Homework	Lecture, Discussion, Quiz	2, 3
6	HTTP Services	2	Homework	Lecture, Discussion, Quiz	2, 3
7	Working with Databases	3	Homework	Lecture, Discussion, Quiz	2, 3
8	Working with Cloud services	3	Homework	Lecture, Discussion, Quiz	
Midterm exam					
9	Web Scrapping	3	Homework	Lecture, Discussion, Quiz	2, 3
10	Web Socket	3	Homework	Lecture, Discussion, Quiz	2, 3
11 - 14	Network Applications in the Industry	3, 4	Homework	Lecture, Discussion, Presentation	2, 3
15	Mini project Demo and Presentation	3,4	Presentation	Test	
Final exam					

4. Assessment plan

Assessment Type	**CLO1**	**CLO2**	**CLO3**	**CLO4**
Mini project (20%)		10%	30%	100%
Labs, Quizzes (20%)	30%	30%	20%	
Midterm examination (30%)	70%	40%		
Final examination (30%)		20%	50%	

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

1. When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.↩

Rubrics (optional)

5.1.Grading checklist

Grading checklist for Written Reports			
Student: …….. HW/Assignment: ……. Date: …… Evaluator: ……			
	Max.	**Score**	**Comments**
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)	10		
TOTAL SCORE	100		

5.2.Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	**Description**
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.3.Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	Issue/ problem to be considered critically is stated without clarification or description.
Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation/ evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.

Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.

Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022

Dean of School of Computer Science and Engineering

Assoc.Prof. Nguyen Van Sinh

Course Name: Physics 2 (Fluid Mechanics and Thermal Physics)

Course Code: PH014IU

1. General information

Course designation	*This subject will provide a basic knowledge of fluid mechanics; macroscopic description of gases; heat and the first law of thermodynamics; heat engines and the second law of thermodynamics; microscopic description of gases and the kinetic theory of gases.*
Semester(s) in which the course is taught	1, 2
Person responsible for the course	Assoc. Prof. Phan Bảo Ngọc Dr. Phan Hiền Vũ
Language	English
Relation to curriculum	Compulsory
Teaching methods	Lecture, lesson, assignment.
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: 90 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): lecture: 30 Private study including examination preparation, specified in hours: 60
Credit points	2
Required and recommended prerequisites for joining the course	None
Course objectives	This course will provide students with: 1. The basic knowledge of Fluid Mechanics and Thermal Physics 2. Skills to solve problems in engineering environment by applying both theoretical and experimental techniques 3. Understanding and skills needed to use physical laws governing real process and to solve them in the engineering environment 4. Confidence and fluency in discussing physics in English.

<table>
<tr><td>Course learning outcomes</td><td>Upon the successful completion of this course students will be able to:
<table>
<tr><th>Competency level</th><th>Course learning outcome (CLO)</th></tr>
<tr><td>Knowledge</td><td>CLO1. An ability to understand basic knowledge of the kinetic energy of ideal gas and the second law of thermal dynamics.
CLO2. An ability to analysis and design a problem in science and engineering</td></tr>
<tr><td>Skill</td><td>CLO3. An ability in applying knowledge of physics</td></tr>
<tr><td>Attitude</td><td>CLO4. An ability to communicate effectively in writing manner</td></tr>
</table></td></tr>
<tr><td>Content</td><td>The description of the contents should clearly indicate the weighting of the content and the level.
Weight: lecture session (2 hours)
Teaching levels: I (Introduce); T (Teach); U (Utilize)
<table>
<tr><th>Topic</th><th>Weight</th><th>Level</th></tr>
<tr><td>Chapter 1: Fluid Mechanics</td><td>2</td><td>I, T</td></tr>
<tr><td>Chapter 2: Temperature, Heat, and the First Law of Thermodynamics</td><td>4</td><td>I, T</td></tr>
<tr><td>Chapter 3: The Kinetic Theory of Gases</td><td>5</td><td>I, T</td></tr>
<tr><td>Chapter 4: Entropy and the Second Law of Thermodynamics</td><td>4</td><td>I, T</td></tr>
</table></td></tr>
<tr><td>Examination forms</td><td>Short-answer questions</td></tr>
<tr><td>Study and examination requirements</td><td>Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.
Assignments/Examination: Students must have more than 50/100 points overall to pass this course.</td></tr>
<tr><td>Reading list</td><td>[1] Halliday D., Resnick R. and Walker, J. (2011) Fundamentals of Physics, 9th edition, John Willey and Sons, Inc.
[2] Alonso M. and Finn E.J. (1992) Physics, Addison-Wesley Publishing Company.
[3] Hecht, E. (2000) Physics: Calculus, 2nd edition, Brooks/Cole.
[4] Faughn/Serway (2006) Serway's College Physics, Thomson Brooks/Cole.</td></tr>
</table>

2. Learning Outcomes Matrix (optional)

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	PLO									
CLO	1	2	3	4	5	6	7	8	9	10
1	x									
2	x									
3										
4										

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
1-2	Chapter 1: Fluid Mechanics	1, 2	Quiz1	Lecture, Discussion, Inclass-Quiz	[1].0. [2].1.
3-6	Chapter 2: Temperature, Heat, and the First Law of Thermodynamics	1, 2	HW1	Lecture, Inclass, HW	[1].9.
7-9	Chapter 3: The Kinetic Theory of Gases (part 1)	3, 4	Quiz2	Lecture, Group work	[2].2.
10	Midterm				
11-12	Chapter 3: The Kinetic Theory of Gases (part 2)	3, 4	Quiz3, HW2	Lecture, Group work, HW	[2]. 4. [1]. 18.
13-16	Chapter 4: Entropy and the Second Law of Thermodynamics	3, 4	HW3, HW4	Lecture, Group work	[3]. 10
17	Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
Attendance + Homework + in-class discussion (15%)				
Quizzes (Qz) / assignment (As) (15%)	Qz1, Qz3/ As.P1 50%Pass	Qz2, Qz4/ As.P2 50%Pass	Qz1, Qz2, Qz3, Qz4 / As.P3 50%Pass	Qz1, Qz2, Qz3, Qz4 / As.P4 50%Pass
Midterm exam (30%)	Q1, Q2, Q3 50%Pass	Q4, Q5 50%Pass	Q3, Q5 50%Pass	Q3, Q5 50%Pass
Final exam (40%)	Q1, Q2, Q3 50%Pass	Q4, Q5 50%Pass	Q3, Q5 50%Pass	Q3, Q5 50%Pass

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics (optional)

1. Grading checklist

Grading checklist for Written Reports			
Student: …….. **Date: ……**	**HW/Assignment: …….** **Evaluator: ……**		
	Max.	**Score**	**Comments**
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	**10**		
Introduction demonstrates thorough knowledge of relevant background and prior work	**15**		
Analysis and discussion demonstrate good subject mastery	**30**		
Summary and conclusions appropriate and complete	**5**		
Organization (10%)			
Distinct introduction, body, conclusions	**5**		
Content clearly and logically organized, good transitions	**5**		
Presentation (20%)			

Correct spelling, grammar, and syntax	**10**		
Clear and easy to read	**10**		
Quality of Layout and Graphics (10%)	**10**		
TOTAL SCORE	**100**		

2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	**Description**
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	Issue/ problem to be considered critically is stated without clarification or description.

Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation / evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective,	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.

	thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	(perspective, thesis/ hypothesis).		
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequence s and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequence s and implications) are oversimplifie d.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.

	presentation cohesive.			
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities)	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference

	make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Course Name: Scientific socialism

Course Code: PE017IU

1. Thông tin chung

Tên môn học (tiếng Việt):	Chủ nghĩa xã hội khoa học
Tên môn học (tiếng Anh):	Scientific socialism
Mã số môn học:	PE017IU
Thuộc khối kiến thức:	Cơ sở
Số tín chỉ:	2
Số tiết lý thuyết:	*30 (trên lớp)*
Số tiết thực hành:	
Số tiết tự học:	*60 (về nhà)*
Môn học trước:	l. Kinh tế chính trị Mác - Lênin, 2. Triết học Mác - Lênin
Giảng viên phụ trách	Khoa Chính trị - Hành chính, ĐHQG-HCM

2. Mục đích/mục tiêu môn học (Course Purposes/Aims)

2.1. Môn học trang bị cho sinh viên những nội dung cơ bản của chủ nghĩa xã hội khoa học (một trong ba bộ phận cấu thành chủ nghĩa Mác - Lênin).

2.2. Giúp cho sinh viên vận dụng những tri thức cơ bản của chủ nghĩa xã hội khoa học một cách sáng tạo trong hoạt động nhận thức và thực tiễn, nhằm giải quyết những vấn đề mà đời sống xã hội của đất nước, của thời đại đang đặt ra.

3. Mô tả môn học (Course Outlines)

Môn học trang bị cho sinh viên những kiến thức cơ bản về chủ nghĩa xã hội khoa học

4. Tài liệu phục vụ học tập:

- Bộ Giáo dục và Đào tạo (2019), *Giáo trình Chủ nghĩa xã hội khoa học,* Nxb. Chính trị quốc gia, Hà Nội.

- Bộ Giáo dục và Đào tạo (2012), *Giáo trình Những Nguyên lý cơ bản của chủ nghãi Mác-Leenin,* Nxb. Chính trị quốc gia, Hà Nội.

- Hội đồng Trung ương (2008), *Giáo trình Chủ nghĩa xã hội khoa học,* Nxb. Chính trị quốc gia, Hà Nội.

5. Chuẩn đầu ra môn học (Course Learning Outcomes)

Chuẩn đầu ra	Mô tả	Tiêu chí đánh giá	Mục tiêu môn học	Chuẩn đầu ra CDIO CTĐT	Mức độ giảng dạy (I/T/U)
5.1. Kiến thức					
LO.1	NHẬP MÔN CHỦ NGHĨA XÃ HỘI KHOA HỌC	LO.1.1 – Khái lược sự ra đời CHủ nghĩa xã hội khoa học, hoàn cảnh lịch sử và vai trò của Các Mác và PH.Ăngghen	2.1	1.1.3	**13**
		LO.1.2 – Nhận biết được các giai đoạn phát triển cơ bản của Chủ nghĩa xã hội khoa học thể hiện qua các tác phẩm			
		LO.1.3 – Nắm rõ được đối tượng, phương pháp và ý nghĩa của việc nghiện cứu Chủ nghĩa xã hội khoa học			
LO.2	SỨ MỆNH LỊCH SỬ CỦA GIAI CẤP CÔNG NHÂN	LO.2.1- Hiểu rõ khái niệm giai cấp coongn hân và đặc điểm của giai cấp công nhan	2.1	1.1.3	T4
		LO.2.2 – Nắm rõ nội dung, đặc điểm sứ mệnh lịch sử của giai cấp công nhân	2.1		
		LO.2.3 – Giải thích được những điều kiện quy định sứ mệnh lịch sử của giai cấp công nhân	2.1		
		LO.2.4 – Phân tích được những điểm tương đồng và khác biệt của giai cấp công nhân hiện nay và việc thực hiện sứ mệnh của giai cấp công nhân trên thế giới hiện nay	2.1 2.1 2.2		
		LO.2.5 – Nắm rõ những đặc điểm cơ bản của giai cấp công nhân Việt Nam và nội dung sứ mệnh lịch sử của giai cấp công nhân Việt Nam hiện nay	2.1 2.2		
		LO.2.6 – Trình bày được phương hướng và một số giải pháp chủ yếu để xây dựng giai			

		cấp công nhân Việt Nam hiện nay			
LO.3	CHỦ NGHĨA XÃ HỘI VÀ THỜI KỲ QUÁ ĐỘ LÊN CHỦ NGHĨA XÃ HỘI	LO.3.1 – Hiểu rõ Chủ nghĩa xã hội là giai đoạn đầu của hình thái kinh tế - xã hội công sản chủ nghĩa	2.1	1.1.3	I3
		LO.3.2 – Trình bày được những đặc trưng cơ bản của chủ nghĩa xã hội			
		LO.3.3 – Giải thích được tính tất yếu khách quan của thời kỳ quá độ lên chủ nghĩa xã hội và những đặc điểm cơ bản của thời kỳ quá độ lên chủ nghĩa xã hội			
		LO.3.4 – Hiểu rõ đặc trưng của thời kỳ quá độ và chủ nghĩa xã hội ở Việt Nam, trình bày được những phương hướng xây dựng chủ nghĩa xã hội ở Việt Nam hiện nay			
LO.4	DÂN CHỦ XÃ HỘI CHỦ NGHĨA VÀ NHÀ NƯỚC XÃ HỘI CHỦ NGHĨA	LO.4.1 – Giải thích được quan niệm về dân chủ và sự ra đời và phát triển dân chủ trong lịch sử xã hội loài người	2.1	1.1.3	T4
		LO.4.2 – Nắm rõ quá trình ra đời và bản chất của nền dân chủ xã hội chủ nghĩa	2.1		
		LO.4.3 – Hiểu được sự ra đời, bản chất và chức năng của nhà nước xã hội chủ nghĩa cũng như mối quan hệ giữa dân chủ và nhà nước	2.1 2.1		
		LO.4.4 - hiểu được sự ra đời phát triển và bản chất của nền dân chủ xã hội chủ nghĩa ở Việt Nam	2.1 2.2		
		LO.4.5 - trình bày được đặc điểm và các giải pháp cơ bản nhằm xây dựng nhà nước pháp quyền xã hội chủ nghĩa ở Việt Nam hiện nay			
		LO.5.1 – Trình bày được khái			

LO.5	CƠ CẤU XÃ HỘI GIAI CẤP VÀ LIÊN MINH GIAI CẤP, TẦNG LỚP TRONG THỜI KỲ QUÁ ĐỘ LÊN CHỦ NGHĨA XÃ HỘI	niệm cơ cấu xã hội – khái quát và sự biến đổi của cơ cấu xã hội giai cấp trong thời kì quá độ lên chủ nghĩa xã hội	2.1	1.1.3	I3
		LO.5.2 – giải thích được tính tất yếu của liên minh giai cấp, tầng trong thời kỳ quá độ lên chủ nghĩa xã hội			
		LO.5.3 – Hiểu rõ cơ cấu xã hội – giai cấp ở Việt Nam trong thời kì quá độ và trình bày những giải pháp cơ bản nhằm xây dựng, phát triển lối liên minh giai cấp, tầng lớp xã hội ở Việt Nam			
LO.6	VẤN ĐỀ DÂN TỘC VÀ TÔN GIÁO TRONG THỜI KỲ QUÁ ĐỘ LÊN CHỦ NGHĨA XÃ HỘI	LO.6.1 – Hiểu rõ khái niệm, đặc trưng cơ bản của dân tộc và quan điểm của chủ nghĩa Mác – Leenin về vấn đề dân tộc	2.1	1.1.3	T4
		LO.6.2 – Trình bày được những đặc điểm cơ bản của dân tộc ở Việt Nam và quan điểm chính sách dân tộc của Đảnh và Nhà nước Việt Nam	2.1		
		LO.6.3 – Hiểu được bản chất, nguồn gốc, tính chất của tôn giáo và nguyên tắc cơ bản giải quyết vấn đề tôn giáo trong thời kỳ quá độ lên chủ nghĩa xã hội	2.1		
		LO.6.4 – Giải thích được những đặc điểm tôn giáo ở Việt Nam và chính sách của Đảng và Nhà nước Việt Nam đối với tín ngưỡng tôn giáo hiện nay	2.1 2.2		
		LO.6.5 – Hiểu rõ được đặc điểm quan hệ dân tộc và tôn giáo ở Việt Nam và trình bày được các định hướng cơ bản nhằm giải quyết mối quan hệ giữa dân tộc và tôn giáo ở Việt	2.1 2.2		

		Nam hiện nay			
LO.7	VẤN ĐỀ GIA ĐÌNH TRONG THỜI KỲ QUÁ ĐỘ LÊN CHỦ NGHĨA XÃ HỘI	LO.7.1 – Khái lược được vị trí, chức năng và vai trò của gia đình trong xã hội LO.7.2 – Nhận biết được các cơ sở xây dựng gia đình trong thời kỳ quá độ lên chủ nghĩa xã hội LO.7.3 – Giải thích được sự biến đổi của gia đình Việt Nam trong thời kỳ quá đội và trình bày được những phương hướng cơ bản xây dựng và phát triển gia đình Việt Nam trong thời kỳ quá độ lên chủ nghĩa xã hội	2.1	1.1.3	I3
5.2. Kỹ năng					
LO.8	THỂ HIỆN KHẢ NĂNG KHÁI QUÁT HÓA, TƯ DUY, TRANG LUẬN, PHẢN BIỆN, LÀM VIỆC NHÓM	LO.8.1 – Có kỹ năng khái quát hóa để rút ra *Từ khóa trí thức* đối với mỗi nội dung và tư duy vó hệ thống LO.8.2 – Có kỹ năng trình bày, thuyết minh, phản biện, tranh luận, hùng biện những tri thức lý luận đang học tập, nghiên cứu dựa trên thực tiễn LO.8.3 – Có kỹ năng giao tiếp xã hội, hợp tác và làm việc nhóm, chia sẻ tri thức và kinh nghiệm, khả năng điều hành nhóm làm việc	2.1 2.2	2.1.1 2.3.1 2.4.4 2.5 3.1.5	U4
LO.9	THỂ HIỆN Ý THỨC NHẬN THỨC TRONG VÀ SAU KHI HỌC TẬP	LO.9.1 – Có ý thức trách nhiệm bảo vệ tính khoa học, cách mạng trong lý luận của chủ nghĩa Mác – Leenin về CNXH và con đường đi lên CNXH ở Việt Nam LO.9.2 – Có ý thức, trách nhiệm cá nhân đối với tập thể, cộng đồng	2.1 2.2	3.1	U3

		LO.9.3 – Có nhận thức về sự cần thiết học tập, nghiên cứu suốt đời và vận dụng nó trong cuộc sống			

6. Kế hoạch giảng dạy theo buổi học (Course Plan):

TT (tiết)	Nội dung giảng dạy	LO	Hoạt động dạy và học	Đánh giá
1 (tiết 1)	Giới thiệu về môn học	LO.1 LO.4	**Dạy:** - Giới thiệu đề cương môn học - Giới thiệu nội dung đề tài thuyết trình nhóm (GHW) **Học ở lớp:** - Chia nhóm (5 SV/nhóm) - Giới thiệu nhóm học tập **Học ngoài lớp:** - Chọn đề tài thuyết trình của nhóm (GHW) - Đọc trước tài liệu chương 1.	
2	**Chương 1** NHẬP MÔN CHỦ NGHĨA XÃ HỘI KHOA HỌC		**Dạy:** 1.SỰ RA ĐỜI CỦA CHỦ NGHĨA XÃ HỘI KHOA HỌC 1.1. Hoàn cảnh lịch sử sự ra đời của chủ nghĩa xã hội khoa học 1.2. Vai trò của C. Mác và Ăngghen 2.CÁC GIAI ĐOẠN PHÁT TRIỂN CƠ BẢN CỦA CHỦ NGHĨA XÃ HỘI KHOA HỌC 2.1. C. Mác và Ph.Ăngghen phát triển chủ nghĩa xã hội khoa học 2.2. V.I.Lênin vận dụng và phát triển sáng tạo chủ nghĩa xã hội khoa học trong điều kiện mới 2.3. Sự vận dụng và phát triển sáng tạo chủ nghĩa xã hội khoa học từ sau khi lênin qua đời đến nay 3. ĐỐI TƯỢNG, PHƯƠNG PHÁP VÀ Ý NGHĨA CỦA VIỆC NGHIÊN CỨU CHỦ NGHĨA XÃ HỘI KHOA HỌC 3.1. Đối tượng nghiên cứu của chủ nghĩa xã hội khoa học 3.2. Phương pháp nghiên cứu của chủ nghĩa xã hội khoa học	Thi giữa kì (Quiz)

			Ý nghĩa của viêc nghiên cứu chủ nghĩa xã hội khoa học **Học ở lớp:** Thảo luận và phát biểu trên lớp **Học ngoài lớp:** - Phác thảo nội dung thuyết trình nhóm GHW - Đọc trước tài liệu chương 2.	
3	**Chương 2** SỨ MỆNH LỊCH SỬ CỦA GIAI CẤP CÔNG NHÂN	LO.2 LO.4 LO.5	**Dạy**: 1.QUAN ĐIỂM CƠ BẢN CỦA CHỦ NGHĨA MÁC - LEENIN VỀ GIAI CÁP CÔNG NHÂN VÀ SỨ MỆNH LỊCH SỬ THẾ GIỚI CỦA GIAI CẤP CÔNG NHÂN 1.1. Khái niệm và đặc điểm của giai cấp công nhân 1.2. Nội dung và đặc điểm sứ mệnh lịch sử của giai cấp công nhân 1.3. Những điều kiện quy định sứ mệnh lịch sử của giai cấp công nhân 2.GIAI CẤP CÔNG NHÂN VÀ VIỆC THỰC HIỆN SỨ MỆNH LỊCH SỬ CỦA GIA1 CẤP CÔNG NHÂN HIỆN NAY 2.1. Giai cấp công nhân hiện nay 2.2. Thực hiện sứ mệnh lịch sử của giai cấp công nhân trên thế giới hiện nay 3.SỨ MỆNH LỊCH SỬ CÙA GIAI CẤP CÔNG NHÂN VIỆT NAM 3.1. Đặc điểm của giai cấp công nhân Việt Nam 3.2. Nội dung sứ mệnh lịch sử của giai cấp công nhân Việt Nam hiện nay 3.3. Phương hướng và một số giải pháp chủ yếu để xây dựng giai cấp công nhân Việt Nam hiện nay **Học ở lớp**: Thảo luận và phát biểu trên lớp **Học ngoài lớp**: Đọc trước tài liệu chương 3	Thi giữa kỳ (Quiz)
	Chương 3	LO.3	**Dạy:** 1. CHỦ NGHĨA XÃ HỘI 1.1. Chủ nghĩa xã hội, giai đoạn đầu của hình thái kinh tế - xã hội công sản chủ nghĩa 1.2. Điều kiện ra dời chủ nghĩa xã hội	

4	CHỦ NGHĨA XÃ HỘI VÀ THỜI KỲ QUÁ ĐỘ LÊN CHỦ NGHĨA XÃ HỘI	LO.4 LO.5	1.3. Những đặt trưng cơ bản của chủ nghĩa xã hội 2. THỜI KỲ QUÁ ĐỘ LÊN CHỦ NGHĨA XÃ HỘI 2.1. Tính tất yếu khách quan của thời kỳ quá độ lên chủ nghĩa xã hội 2.2. Đặc điểm của thời kỳ quá độ lên chủ nghĩa xã hội 3. QUÁ ĐỘ LÊN CHỦ NGHĨA XÃ HỘI Ở VIỆT NAM 3.1. Quá độ lên chủ nghĩa xã hội bỏ qua chế độ tư bản chủ nghĩa 3.2. Những đặc trưng cơ bản của chủ nghĩa xã hội và phương hướng xây dựng chủ nghĩa xã hội ở Việt Nam hiện nay **Học ở lớp:** Thảo luận và phát biểu trên lớp **Học ngoài lớp:** Đọc trước tài liệu chương 4	Thuyết trình nhóm (GHW) Thi giữa kỳ (Quiz)
5	**Chương 4** DÂN CHỦ XÃ HỘI CHỦ NGHĨA VÀ NHÀ NƯỚC XÃ HỘI CHỦ NGHĨA	LO.2 LO.4 LO.5	**Dạy:** 1. DÂN CHỦ VÀ DÂN CHỦ XÃ HỘI CHỦ NGHĨA 1.1. Dân chủ và sự ra đời, phát triển của dân chủ 1.2. Dân chủ xã hội chủ nghĩa 2. NHÀ NƯỚC XÃ HỘI CHỦ NGHĨA 2.1. Sự ra đời, bản chất, chức năng của nhà nước xã hội chủ nghĩa 2.2. Mối quan hệ giữa dân chủ xã hội chủ nghĩa và nhà nước xã hội chủ nghĩa 3. DÂN CHỦ XÃ HỘI CHỦ NGHĨA VÀ NHÀ NƯỚC PHÁP QUYỀN XÃ HỘI CHỦ NGHĨA Ở VIỆT NAM 3.1. Dân chủ xã hội chủ nghĩa ở Việt Nam 3.2. Nhà nước pháp quyền xã hội chủ nghĩa ở Việt Nam hiện nay 3.3. Phát huy dân chủ xã hội chủ nghĩa, xây dựng nhà nước pháp quyền xã hội chủ nghĩa ở Việt Nam **Học ở lớp:** Thảo luận và phát biểu **Học ngoài lớp:** Đọc trước tài liệu chương 5 trên lớp	Thuyết trình nhóm (GHW) Thi cuối kỳ (FEX)

6	Chương 5 CƠ CẤU XÃ HỘI – GIAI CẤP VÀ LIÊN MINH GIAI CẤP, TẦNG LỚP TRONG THỜI KỲ QUÁ ĐỘ LÊN CHỦ NGHĨA XÃ HỘI	LO.3 LO.4 LO.5	**Dạy:** 1. CƠ CẤU XÃ HỘI GIAI CẤP TRONG THỜI KỲ QUÁ ĐỘ LÊN CHỦ NGHĨA XÃ HỘI 1.1. Khái niệm và vị trí của cơ cấu xã hội - giai cấp trong cơ cấu xã hội 1.2. Sự biến đổi có tính quy luật của cơ cấu xã hội - giai cấp trong thời kỳ quá độ lên chủ nghĩa xã hội 2. LIÊN MINH GIAI CẤP, TẦNG LỚP TRONG THỜI KỲ QUÁ ĐỘ LÊN CHỦ NGHĨA XÃ HỘI 3. CƠ CẤU XÃ HỘI - GIAI CẤP VÀ LIÊN MINH GIAI CẤP, TẦNG LỚP TRONG THỜI KỲ QUÁ ĐỘ LÊN CHỦ NGHĨA XÃ HỘI Ở VIỆT NAM 3.1. Cơ cấu xã hội - giai cấp trong thời kỳ quá độ lên chủ nghĩa xã hội ở Việt Nam 3.2. Liên minh giai cấp, tầng lớp trong thời kỳ quá độ lên chủ nghĩa xã hội ở Việt Nam **Học ở lớp:** Thảo luận và phát biểu trên lớp **Học ngoài lớp:** Đọc trước tài liệu chương 6	Thuyết trình nhóm (GHW) Thi cuối kỳ (FEX)
7	**Chương 6** VẤN ĐỀ DÂN TỘC VÀ TÔN GIÁO TRONG THỜI KỲ QUÁ ĐỘ LÊN CHỦ NGHĨA XÃ HỘI	LO.2 LO.4 LO.5	**Dạy:** 1. DÂN TỘC TRONG THỜI KỲ QUÁ ĐỘ LÊN CHỦ NGHĨA XÃ HỘI 1.1. Chủ nghĩa Mác - Lênin về dân tộc 1.2. Dân tộc và quan hệ dân tộc ở Việt Nam 2. TÔN GIÁO TRONG THỜI KỲ QUÁ ĐỘ LÊN CHỦ NGHĨA XÃ HỘI 2.1. Chủ nghĩa Mác - Lênin về tôn giáo 2.2. Tôn giáo ở Việt Nam và chính sách tôn giáo của Đảng, Nhà nước ta hiện nay 3. QUAN HỆ DÂN TỘC VÀ TÔN GIÁO Ở VIỆT NAM 3.1. Đặc điểm quan hệ dân tộc và tôn giáo ở Việt Nam 3.2. Định hướng giải quyết mối quan hệ dân tộc và tôn giáo ở Việt Nam hiện nay	Thuyết trình nhóm (GHW) Thi cuối kỳ (FEX)

			3.3. Phương hướng và một số giải pháp chủ yếu để xây dựng giai cấp công nhân Việt Nam hiện nay **Học ở lớp:** Thảo luận và phát biểu trên lớp **Học ngoài lớp:** Đọc trước tài liệu chương 7	
8	**Chương 7** VẤN ĐỀ GIA ĐÌNH TRONG THỜI KỲ QUÁ ĐỘ LÊN CHỦ NGHĨA XÃ HỘI		**Dạy:** 1. KHÁI NIỆM, VỊ TRÍ VÀ CHỨC NĂNG CỦA GIA ĐÌNH 1.1. Khái niệm gia đình 1.2. Vị trí của gia đình trong xã hội 1.3. Chức năng cơ bản của gia đình 2.CƠ SỞ XÂY DỰNG GIA ĐÌNH TRONG THỜI KỲ QUÁ ĐỘ LÊN CHỦ NGHĨA XÃ HỘI 2.1. Cơ sở kinh tế - xã hội 2.2. Cơ sở chính trị - xã hội 2.3. Cơ sở văn hóa 3.XÂY DỰNG GIA ĐÌNH VIỆT NAM TRONG THỜI KỲ QUÁ ĐỘ LÊN CHỦ NGHĨA XÃ HỘI 3.1. Sự biến đổi gia đình Việt Nam trong thời kỳ quá độ lên chủ nghĩa xã hội 3.2. Phương hướng cơ bản xây dựng và phát triển gia đình Việt Nam trong thời kỳ quá độ lên chủ nghĩa xã hội **Học ở lớp:** Thảo luận và phát biểu trên lớp **Học ngoài lớp:** Hoàn thiện bài thuyết trình	Thuyết trình nhóm (GHW) Thi cuối kỳ (FEX)

7. Đánh giá môn học

STT	Mã	Tên	Mô tả	Tỷ trọng	Hình thức	LO
1	GHW	Thuyết trình nhóm	Thuyết trình nhóm về đề tài đã phân công	15%	Thuyết trình và bản báo cáo nhóm	LO.3 LO.4 LO.5 LO.6 LO.7
2	Quiz	Bài thi giữa	Thi theo đề thi của GV	20%	Tự luận đề mở	LO.1 LO.2 LO.3

3	DIC	Thảo luận, chuyên cần tại lớp (Discussion in Class)	Điểm thảo luận được tính theo phương pháp tương đối. SV có số lần thảo luận tại lớp nhiều nhất sẽ được điểm tối đa, điểm của các bạn khác được tính	15%	Phát biểu/đặt câu hỏi trên lớp hoặc phiếu trả lời trong các nghiên cứu tình huống tại lớp	LO.3 LO.4 LO.5 LO.6 LO.7
4	FEX	Thi cuối kỳ	Đề thi bao quát toàn bộ nội dung môn học	50%	Tự luận đề đóng	LO.3 LO.4 LO.5 LO.6 LO.7
			Tổng cộng	**100%**		

8. Tiêu chí đánh giá chuẩn đầu ra môn học

TT	Chuẩn đầu ra	Nội dung	Phương pháp	Tiêu chí đánh giá
LO.1	Nhận biết quá trình ra đời của Chủ nghĩa xã hội khoa học và các giai đoạn phát triển cơ bản	Chương 1	Thi giữa kỳ (Quiz)	Ngân hàng đề thi của GV
LO.2 LO.4	Nắm rõ nội dung: quan điểm cơ bản của chủ nghĩa Mác - Lênin về giai cấp công nhân, nội dung, biểu hiện và ý nghĩa của sứ mệnh đó trong bối cảnh hiện nay	Chương 2	Thi giữa kỳ (Quiz)	Ngân hàng đề thi của GV

LO.3 LO.4	Nhận biết và nắm được những quan điểm cơ bản của chủ nghĩa Mác - lênin về chủ nghĩa xã hội, thời kỳ quá độ lên chủ nghĩa xã hội và sự vận dụng sáng tạo của Đảng Cộng sản Việt Nam vào điều kiện cụ thể của Việt Nam	Chương 3	Thảo luận tại lớp (Discussion in Class) Thi giữa kỳ (Quiz)	Tiêu chí đánh giá thuyết trình nhóm, thảo luận tại lớp Ngân hàng đề thi của GV
LO.3 LO.4	Nhận biết và nắm được bản chất của nền dân chủ xã hội chủ nghĩa và nhà nước xã hội chủ nghĩa nói chung và ở Việt Nam nói riêng	Chương 4	Thảo luận tại lớp (Discussion in Class) Thi cuối kỳ (FEX)	Tiêu chí đánh giá thuyết trình nhóm, thảo luận tại lớp Ngân hàng đề thi của Khoa
LO.3 LO.4	Nhận biết và nắm được những kiến thức nền tảng về cơ cấu xã hội - giai cấp và liên minh giai cấp, tầng lớp trong thời kỳ quá độ độ lên chủ nghĩa xã hội	Chương 5	Thảo luận tại lớp (Discussion in Class), Thi cuối kỳ (FEX)	Tiêu chí đánh giá thuyết trình nhóm, thảo luận tại lớp Ngân hàng đề thi của Khoa
LO.3 LO.4	Nhận biết và nắm được những quan điểm cơ bản của chủ nghĩa Mác - Lênin về dân tộc, tôn giáo, mối quan hệ giữa dân tộc và tôn giáo, tầm quan trọng của vấn đề dân tộc, tôn giáo và nội dung chính sách dân tộc, tôn giáo của Đảng và Nhà nước Việt	Chương 6	Thảo luận tại lớp (Discussion in Class), Thi cuối kỳ (FEX)	Tiêu chí đánh giá thuyết trình nhóm, thảo luận tại lớp Ngân hàng đề thi của Khoa
LO.3 LO.4	Nhận biết và nắm được những quan điểm cơ bản của chủ nghĩa Mác - Lênin, tư tưởng Hồ Chí Minh và Đảng Cộng sản Việt Nam về gia đình, xây dựng gia đình trong thời kỳ quá độ lên chủ nghĩa xã hội hiện nay.	Chương 7	Thảo luận tại lớp (Discussion in Class) Thi cuối kỳ (FEX)	Tiêu chí đánh giá thuyết trình nhóm, thảo luận tại lớp Ngân hàng đề thi của Khoa

9. Một số lưu ý khác:

- Khi có các thắc mắc liên quan môn học, sinh viên có thể liên lạc với quản lý Bộ môn Hồ Chí Minh học & Lịch sử Đảng và Khoa Chính trị - Hành chính qua email: daotao.spas@vnuhcm.edu.vn

- Quy định về Bài thuyết trình nhóm GHW

+ Thành lập nhóm: 5 sinh viên/nhóm. Hạn chót đăng ký đề tài nhóm Quản lý trên forum là Buổi 2 hoặc trực tiếp nộp cho GV buổi 1.

+ Giảng dạy kết thúc chương 3, các nhóm thuyết trình theo thứ tự. Lưu ý các nhóm cần có mặt đủ và mang theo tất cả các tài liệu liên quan đến GHW khi đi thuyết trình

+ Hình thức nộp bài: Nộp file và biên bản làm việc nhóm qua mail cho GV

- Quy định về giờ giấc, chuyên cần, kỷ luật trong khóa học: Lên lớp đúng giờ, dự tối thiểu 80% thời gian học trên lớp (chỉ được phép vắng mặt tối đa 20% số tiết học). Nếu vắng quá số tiết quy định sẽ bị cấm thi theo quy chế. Có đầy đủ điểm kiểm tra, điểm thi kết thúc học phần và nhiệt tình thảo luận, phát biểu xây dựng bài, nghiêm túc trong giờ học

Course Name: Information System Management

Course Code: IT094IU

1. General information

Course designation	This course covers the concepts of information systems and their applications to business processes
Semester(s) in which the course is taught	6
Person responsible for the course	Dr. Tran Thanh Tung
Language	English
Relation to curriculum	Elective course (CS, DS) Specialization (required) (NE)
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	Total workload: 195 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 45 (lecture) + 30 (laboratory) Private study including examination preparation, specified in hours: 120
Credit points	Number of credits : 4 Lecture: 3 Laboratory: 1
Required and recommended prerequisites for joining the course	Principles of Database Management
Course objectives	This course will aim to provide students with:The concepts of information systems and their applications to business processes.Use of computer-based information systems in functional areas of business. Understanding of computer and information technology, resources, management and end-user decision making, and system development.
Course learning outcomes	CLO 1. understand basic information system concepts as applied to business operations and management. CLO 2. identify the major components of a computer system, including hardware, software, operating systems and operating environments as they apply to information systems. CLO 3. develop basic MIS applications such as spreadsheet, database, and web development. **Competency level** — **Course learning outcome (CLO)** Knowledge — 1, 2

	Skill	3
	Attitude	

Content

The description of the contents should clearly indicate the weighting of the content and the level.
Weight: lecture session (3 hours)
Teaching levels: I (Introduce); T (Teach); U (Utilize)

Topic	**Weight**	**Level**
Information Systems in Global Business;	1	I
Global E-Business and Collaboration;	1	I
Information Systems, Organizations and Strategy	2	T
Ethical and Social Issues in Information Systems;	1	T
Telecommunications, the Internet, and Wireless Technology;	1	T
Foundations of Business Intelligence: Databases and Information Management	1	T,U
E-Commerce: Digital Markets, Digital Goods;	2	T,U
Achieving Operational Excellence and Customer Intimacy: Enterprise Applications;	2	T,U
Building Information Systems;	2	T,U
Managing Knowledge;	1	T
Enhancing Decision Making.	1	T

Examination forms

Multiple-choice questions, short-answer questions

Study and examination requirements

Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.
Assignments/Examination: Students must have more than 50/100 points overall to pass this course.

Reading list

1. Kenneth C. Laudon, Jane P. Laudon, Management Information Systems: Managing the Digital Firm 14th, 2016
2. Kenneth C. Laudon and Jane Laudon, Essentials of Management Information Systems 11th, 2015

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO					

CLO	1	2	3	4	5	6
1		x		x		
2		x		x		
3		x				

3. **Planned learning activities and teaching methods**

Week	**Topic**	**CLO**	**Assessments**	**Learning activities**	**Resources**
1	Information Systems in Global Business;	1	Midterm exam	In-class activities	
2	Global E-Business and Collaboration;	1	Midterm exam	In-class activities	
3	Information Systems, Organizations and Strategy	1,2	Midterm exam, Quiz	In-class activities, Lab	
4	Ethical and Social Issues in Information Systems;	1	Midterm exam		
5	Telecommunications, the Internet, and Wireless Technology;	2	Midterm exam	In-class activities, Lab	
6	**Midterm**				
7	Foundations of Business Intelligence: Databases and Information Management	2,3	Final exam	In-class activities, Lab	
8	E-Commerce: Digital Markets, Digital Goods;	1	Final exam	In-class activities, Lab	
9	Achieving Operational Excellence and Customer Intimacy: Enterprise Applications;	1	Final exam	In-class activities, Lab	
10	Building Information Systems;	2,3	Final exam	In-class activities, Lab	
11	Managing Knowledge;	1	Final exam		
12	Enhancing Decision Making.	1	Final exam		
13	**Final exam**				

4. **Assessment plan**

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

Assessment Type	CLO1	CLO2	CLO3
Midterm examination (30%)	40%	30%	20%
Projects/Presentations/ Report (20%)		40%	60%
Final examination (40%)	30%	20%	20%
Exercises/ Quiz (20%)	30%	10%	

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5. Rubrics (optional)

5.1. Grading checklist

Grading checklist for Written Reports			
Student: …….. Date: ……	HW/Assignment: ……. Evaluator: ……		
	Max.	**Score**	**Comments**
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)	10		
TOTAL SCORE	100		

5.2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	**Description**
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.

2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	Issue/ problem to be considered critically is stated without clarification or description.
Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation / evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.

Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's	Conclusion is logically tied to a range of information, including opposing viewpoints; related	Conclusion is logically tied to information (because information is chosen to fit the	Conclusion is inconsistently tied to some of the information discussed; related outcomes

	informed evaluation and ability to place evidence and perspectives discussed in priority order.	outcomes (consequences and implications) are identified clearly.	desired conclusion); some related outcomes (consequences and implications) are identified clearly.	(consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.

Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable,	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

	and strongly supported.)			

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022

Dean of School of Computer Science and Engineering

Assoc.Prof. Nguyen Van Sinh

Course Name: System and Network Security

Course Code: IT117

1. General information

Course designation	This course introduces students to the fundamentals of compute security in including software security, cryptography, network security and web security.
Semester(s) in which the course is taught	7,9
Person responsible for the course	MSc. Le Thanh Son
Language	English
Relation to curriculum	Elective (CE) Compulsory (NE)
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	Total workload: 195 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 45 (lecture) + 30 (laboratory) Private study including examination preparation, specified in hours: 120
Credit points	Number of credits: 4 Lecture: 3 Laboratory: 1
Required and recommended prerequisites for joining the course	Computer Networks
Course objectives	This course introduces students to cryptography systems (symmetric and public key encryptions), basic information theory, authentication and authorization, database security, malicious software, denial of service attacks, intrusion detection and prevention systems, firewalls, buffer overflow attack and software security, Internet security protocols and standards, Internet authentication applications, and wireless security.
Course learning outcomes	CLO 1. Gain understanding of the cryptography concepts including symmetric key encryption, hash function, message authentication code, public key encryption, digital signature and digital envelope; CLO 2. Apply the concepts of authentication and authorization in implementing secure systems and networks; CLO 3. Understand and categorize the malicious software and their attacking mechanisms;

CLO 4. Explore the buffer overflow attacks and fuzzing to find software vulnerabilities, and obtain the knowledge of software and operating system security;
CLO 5. Understand and practice Internet security protocols and authentication applications;
CLO 6. Analyze the wireless security.

Competency level	**Course learning outcome (CLO)**
Knowledge	CLO1, CLO2, CLO3, CLO5
Skill	CLO4, CLO6
Attitude	

Content

The description of the contents should clearly indicate the weighting of the content and the level.
Weight: lecture session (~~3~~ hours)
Teaching levels: I (Introduce); T (Teach); U (Utilize)

Topic	**Weight**	**Level**
Cryptographic systems (symmetric and public key systems);	2	T
Authentication and authorization;	1	T,U
Malicious software;	1	T
Database and cloud security;	2	T,U
Denial of service attacks;	1	T,U
Intrusion detection and prevention systems, firewalls;	1	T
Buffer overflow and software security;	2	T,U
Operating system security;	2	T,U
Internet security protocols;	1	T
Internet authentication applications;	1	T
Wireless security.	1	T,U

Examination forms

Multiple-choice questions, short-answer questions

Study and examination requirements

Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.
Assignments/Examination: Students must have more than 50/100 points overall to pass this course.

Reading list

1. William Stallings and Lawrence Brown, Computer Security - Principles and Practice 3rd, 2015

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-6) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO					
CLO	1	2	3	4	5	6
1	X		X	X		
2		X				
3	X					
4	X					
5	X					
6	X					

3. Planned learning activities and teaching methods

Week	**Topic**	**CLO**	**Assessments**	**Learning activities**	**Resources**
1	Cryptographic systems (symmetric and public key systems);	1	Quiz, Exam	Lecture, Exercises, Lab	[1]
2	Authentication and authorization;	2	Quiz, Exam	Lecture, Lab	[1]
3	Malicious software;	3	Quiz, Exam	Lecture, Lab	[1]
4	Database and cloud security;	3	Quiz, Exam	Lecture, Lab	[1]
5	Denial of service attacks;	3	Quiz, Exam	Lecture	[1]
6	**Midterm**				
7	Intrusion detection and prevention systems, firewalls;	2	Quiz, Exam	Lecture	[1]
8	Buffer overflow and software security;	4	Quiz, Exam	Lecture, Lab	[1]
9	Operating system security;	4	Quiz, Exam	Lecture, Lab	[1]
10	Internet security protocols;	5	Quiz, Exam	Lecture, Exercises,	[1]
11	Internet authentication applications;	5	Quiz, Exam	Lecture, Exercises,	[1]
12	Wireless security.	6	Quiz, Exam	Lecture, Lab	[1]

13	**Final exam**				

4. Assessment plan

Assessment Type	**CLO1**	**CLO2**	**CLO3**	**CLO4**	**CLO5**	**CLO6**
Midterm examination (30%)	70%	80%	55%			
Final examination (40%)				75%	70%	75%
Exercises/ Quiz (30%)	30%	20%	45%	25%	30%	25%

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

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1. When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.↩

Rubrics (optional)

5.1. Grading checklist

Grading checklist for Written Reports			
Student: …… HW/Assignment: ……. Date: …… Evaluator: ……			
	Max.	**Score**	**Comments**
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)	10		
TOTAL SCORE	100		

5.2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	**Description**
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	Issue/ problem to be considered critically is stated without clarification or description.
Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis.	Information is taken from source(s) with some interpretation/ evaluation, but not enough to develop a coherent analysis or	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact,

	Viewpoints of experts are questioned thoroughly.	Viewpoints of experts are subject to questioning.	synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place	Conclusion is logically tied to a range of information, including opposing viewpoints; related	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion);	Conclusion is inconsistently tied to some of the information discussed; related outcomes

	evidence and perspectives discussed in priority order.	outcomes (consequences and implications) are identified clearly.	some related outcomes (consequences and implications) are identified clearly.	(consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.

Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandabilit y of the presentation, and speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022

Dean of School of Computer Science and Engineering

Assoc.Prof. Nguyen Van Sinh

Course Name: Physics 3

Course Code: PH015IU

1. General information

Course designation	*This subject will provide a basic knowledge of electricity and magnetism.*
Semester(s) in which the course is taught	1, 2
Person responsible for the course	Assoc. Prof. Phan Bảo Ngọc
Language	English
Relation to curriculum	Compulsory
Teaching methods	Lecture, lesson, assignment.
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: 135 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): lecture: 45 Private study including examination preparation, specified in hours: 90
Credit points	3
Required and recommended prerequisites for joining the course	Physics 1
Course objectives	This course will provide students with: 1. The basic knowledge of electricity and magnetism such as electric charge, electric potential, magnetic fields, electromagnetic waves, etc. 2. Skills to solve problems in engineering environment by applying both theoretical and experimental techniques. 3. Understanding and skills needed to use physical laws governing real process and to solve them in the engineering environment. 4. Confidence and fluency in discussing physics in English.

<table>
<tr><td>Course learning outcomes</td><td>Upon the successful completion of this course students will be able to:
<table>
<tr><th>Competency level</th><th>Course learning outcome (CLO)</th></tr>
<tr><td>Knowledge</td><td>CLO1. An ability to understand basic knowledge of electricity and magnetism such as electric charge, electric potential, magnetic fields, electromagnetic waves.
CLO2. Examine problem solving in engineering environment</td></tr>
<tr><td>Skill</td><td>CLO3. Understand and acquire skills needed to use physical laws governing real process and to solve them in the engineering environment</td></tr>
<tr><td>Attitude</td><td>CLO4. Develop confidence and fluency in discussing physics in English</td></tr>
</table></td></tr>
<tr><td>Content</td><td>The description of the contents should clearly indicate the weighting of the content and the level.
Weight: lecture session (3 hours)
Teaching levels: I (Introduce); T (Teach); U (Utilize)
<table>
<tr><th>Topic</th><th>Weight</th><th>Level</th></tr>
<tr><td>Chapter 1: Electric Fields</td><td>3</td><td>I, T, U</td></tr>
<tr><td>Chapter 2: Electric Potential and Capacitance</td><td>2</td><td>I, T, U</td></tr>
<tr><td>Chapter 3: Current and Resistance. Direct Current Circuits</td><td>3</td><td>I, T, U</td></tr>
<tr><td>Chapter 4: Magnetism</td><td>2</td><td>I, T, U</td></tr>
<tr><td>Chapter 5: Electromagnetic Induction</td><td>2</td><td>I, T, U</td></tr>
<tr><td>Chapter 6: Electromagnetic Oscillations and Alternating Current</td><td>2</td><td>I, T, U</td></tr>
<tr><td>Chapter 7: Maxwell’s Equation and Electromagnetic Waves</td><td>1</td><td>I, T, U</td></tr>
</table></td></tr>
<tr><td>Examination forms</td><td>Short-answer questions</td></tr>
</table>

Study and examination requirements	Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. Assignments/Examination: Students must have more than 50/100 points overall to pass this course.
Reading list	[1] Halliday D., Resnick R. and Walker, J. (2011) *Fundamentals of Physics*, 9th edition, John Willey and Sons, Inc. [2] Alonso M. and Finn E.J. (1992) *Physics,* Addison-Wesley Publishing Company. [3] Hecht, E. (2000) *Physics: Calculus,* 2nd edition, Brooks/Cole. [4] Faughn/Serway (2006) *Serway's College Physics*, Thomson Brooks/Cole.

2. Learning Outcomes Matrix (optional)

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-10) is shown in the following table:

	PLO									
CLO	1	2	3	4	5	6	7	8	9	10
1	x									
2	x									
3										
4										

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
1-3	Chapter 1: Electric Fields	1, 2, 3, 4	Quiz 1/ Assignment Midterm exam	Lecture, Discussion	[1].0. [2].1.
4-5	Chapter 2: Electric Potential and Capacitance	1, 2, 3, 4	Quiz 2/ Assignment Midterm exam	Lecture, Discussion	[1].9.
6-7	Chapter 3: Current and Resistance. Direct Current Circuits	1, 2, 3, 4	Assignment Midterm exam	Lecture, Discussion	[2].2.
8	Chapter 4: Magnetism (Part 1)	1, 2, 3, 4	Assignment Final exam	Lecture, Discussion	[2]. 4. [1]. 18.

Week	Topic	CLO	Assessments	Learning activities	Resources
9-10	Midterm				
11-12	Chapter 4: Magnetism (Part 2)	1, 2, 3, 4	Quiz 3/ Assignment Final exam	Lecture, Discussion	[2]. 4. [1]. 18.
13-14	Chapter 5: Electromagnetic Induction	1, 2, 3, 4	Quiz 4/ Assignment Final exam	Lecture, Discussion	[3]. 10
15-16	Chapter 6: Electromagnetic Oscillations and Alternating Current	1, 2, 3, 4	Assignment Final exam	Lecture, Discussion	[2]. 4. [1]. 18.
17	Chapter 7: Maxwell's Equation and Electromagnetic Waves	1, 2, 3, 4	Final exam	Lecture	[3]. 10
18-19	Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
Attendance + Homework + in-class discussion (15%)				
Quizzes (Qz) / assignment (As) (15%)	Qz1, Qz3/ As.P1 50%Pass	Qz2, Qz4/ As.P2 50%Pass	Qz1, Qz2, Qz3, Qz4 / As.P3 50%Pass	Qz1, Qz2, Qz3, Qz4 / As.P4 50%Pass
Midterm exam (30%)	Q1, Q2, Q3 50%Pass	Q4, Q5 50%Pass	Q3, Q5 50%Pass	Q3, Q5 50%Pass
Final exam (40%)	Q1, Q2, Q3 50%Pass	Q4, Q5 50%Pass	Q3, Q5 50%Pass	Q3, Q5 50%Pass

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics (optional)

5.1. Grading checklist

Grading checklist for Written Reports	
Student: ……..	**HW/Assignment: …….**
Date: ……	

	Evaluator: ……		
	Max.	**Score**	**Comments**
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	**10**		
Introduction demonstrates thorough knowledge of relevant background and prior work	**15**		
Analysis and discussion demonstrate good subject mastery	**30**		
Summary and conclusions appropriate and complete	**5**		
Organization (10%)			
Distinct introduction, body, conclusions	**5**		
Content clearly and logically organized, good transitions	**5**		
Presentation (20%)			
Correct spelling, grammar, and syntax	**10**		
Clear and easy to read	**10**		
Quality of Layout and Graphics (10%)	**10**		
TOTAL SCORE	**100**		

5.2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	**Description**
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	Issue/ problem to be considered critically is stated without clarification or description.
Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation / evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions).

	relevance of contexts when presenting a position.		position. May be more aware of others' assumptions than one's own (or vice versa).	Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	Milestone		Benchmark
	4	3	2	1
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and

	appears polished and confident.	appears comfortable.	appears tentative.	speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

6. **Date revised: January 12, 2022**

Course Name: Physics 3 Laboratory

Course Code: PH016IU

1. General information

Course designation	*This course provides students with basic knowledge of electricity and magnetism in laboratory, consists of: Ohm's law, LRC circuit, RC circuit, LR circuit, magnetic fields of coils….*
Semester(s) in which the course is taught	1, 2
Person responsible for the course	Msc. Lê Thị Quế Msc. Trịnh Thanh Thủy
Language	English
Relation to curriculum	Compulsory
Teaching methods	Lecture, lesson, assignment.
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: 60 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): lecture: 30 Private study including examination preparation, specified in hours: 30
Credit points	1
Required and recommended prerequisites for joining the course	Physics 3 (PH015IU)
Course objectives	This course will provide students with: 4. The basic concepts in electricity and magnetism. Have laboratory experiences. 5. Skills to solve problems in engineering environment by applying both theoretical and experimental techniques 6. Skill to present scientific report in writing, and better understand the relations between theory and experiment. 7. Confidence and fluency in discussing physics in English.

<table>
<tr><td>Course learning outcomes</td><td>Upon the successful completion of this course students will be able to:
<table>
<tr><th>Competency level</th><th>Course learning outcome (CLO)</th></tr>
<tr><td>Knowledge</td><td>CLO1. Understand the basic concepts in electricity and magnetism.</td></tr>
<tr><td>Skill</td><td>CLO2. Approach and solve problems in Electricity and magnetism experiments
CLO3. Write scientific report, have understanding the relations between theory and experiment</td></tr>
<tr><td>Attitude</td><td>CLO4. An ability to communicate effectively in writing English manner</td></tr>
</table></td></tr>
<tr><td>Content</td><td>The description of the contents should clearly indicate the weighting of the content and the level.
Weight: experimental session (4 hours)
Teaching levels: I (Introduce); T (Teach); U (Utilize)
<table>
<tr><th>Topic</th><th>Weight</th><th>Level</th></tr>
<tr><td>Ohm’s law</td><td>1</td><td>T, U</td></tr>
<tr><td>Resistances in Circuits</td><td>1</td><td>T, U</td></tr>
<tr><td>LRC Circuits</td><td>1</td><td>T, U</td></tr>
<tr><td>Kirchhoff’s laws</td><td>1</td><td>T, U</td></tr>
<tr><td>RC circuit</td><td>1</td><td>T, U</td></tr>
<tr><td>LR circuit</td><td>1</td><td>T, U</td></tr>
<tr><td>Magnetic fields of coils</td><td>1</td><td>T, U</td></tr>
<tr><td>The e/m experiment</td><td>1</td><td>T, U</td></tr>
</table></td></tr>
<tr><td>Examination forms</td><td>Short-answer questions, taking experiment, write report</td></tr>
<tr><td>Study and examination requirements</td><td>Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.
Assignments/Examination: Students must have more than 50/100 points overall to pass this course.</td></tr>
<tr><td>Reading list</td><td>[1] Halliday D., Resnick R. and Walker, J. (2011) Fundamentals of Physics, 9th edition, John Willey and Sons, Inc.</td></tr>
</table>

	[2] Labguide

2. Learning Outcomes Matrix (optional)

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	PLO									
CLO	1	2	3	4	5	6	7	8	9	10
1	x									
2	x									
3										
4										

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
1	Ohm's law	1, 2	Prelab answer, Lab report	Taking experiment	[1]. [2].
2	Resistances in Circuits	1, 2	Prelab answer, Lab report	Taking experiment	[1]. [2].
3	LRC Circuits	1, 2	Prelab answer, Lab report	Taking experiment	[1]. [2].
4	Kirchhoff's laws	1, 2	Prelab answer, Lab report	Taking experiment	[1]. [2].
5	RC circuit	1, 2	Prelab answer, Lab report	Taking experiment	[1]. [2].
6	LR circuit	1, 2	Prelab answer, Lab report	Taking experiment	[1]. [2].
7	Magnetic fields of coils	1, 2	Prelab answer, Lab report	Taking experiment	[1]. [2].
8	The e/m experiment	1, 2	Prelab answer, Lab report	Taking experiment	[1]. [2].
9	Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
Prelab (20%)	Prelab1-8 60%Pass			Prelab1-8 60%Pass

Lab report (30%)	Labreport 1-8 50%Pass	Labreport 1-8 50%Pass	Labreport 1-8 50%Pass	Labreport 1-8 50%Pass
Attendance (20%)				
Final exam (30%)	Part I.1 50%Pass	Part I.2 50%Pass	Part II.1,2 50%Pass	Part II.3 50%Pass

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics (optional)

5.1. Grading checklist

Grading checklist for Written Reports			
Student: …….. **Date: ……**	**HW/Assignment: …….** **Evaluator: ……**		
	Max.	**Score**	**Comments**
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	**10**		
Introduction demonstrates thorough knowledge of relevant background and prior work	**15**		
Analysis and discussion demonstrate good subject mastery	**30**		
Summary and conclusions appropriate and complete	**5**		
Organization (10%)			
Distinct introduction, body, conclusions	**5**		
Content clearly and logically organized, good transitions	**5**		
Presentation (20%)			
Correct spelling, grammar, and syntax	**10**		
Clear and easy to read	**10**		
Quality of Layout and Graphics (10%)	**10**		
TOTAL SCORE	**100**		

5.2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	**Description**
5	Demonstrates complete understanding of the problem. All requirements of task are included in response

4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	Issue/ problem to be considered critically is stated without clarification or description.
Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation / evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact,	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.

			with little questioning.	
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.

Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the	Language choices are thoughtful and generally support the effectiveness of the presentation.	Language choices are mundane and commonplace and partially support the effectiveness of the	Language choices are unclear and minimally support the effectiveness of the presentation. Language in

	effectiveness of the presentation. Language in presentation is appropriate to audience.	Language in presentation is appropriate to audience.	presentation. Language in presentation is appropriate to audience.	presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.

Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: January 12, 2022

Course Name: History of Vietnamese communist party

Course Code: PE018IU

1. Thông tin chung

Tên môn học (tiếng Việt); Tên môn học (tiếng Anh):	Lịch sử Đảng Cộng sản Việt Nam History of Vietnamese communist party
Mã số môn học:	PE018IU
Thuộc khối kiến thức: Số tín chỉ:	CƠ SỞ 2
Số tiết lý thuyết:	*20 (trên lớp)*
Số tiết thực hành: *Số tiết tự học:*	*10 (trên lớp)* *90 (về nhà)*
Môn học trước:	1. Triết học Mác - Lênin, 2. Kinh tế chính trị Mác - Lênin, 3. Chủ nghĩa xã hội khoa học
Giảng viên phụ trách	Khoa Chính trị - Hành chính, ĐHQG-HCM

2. Mục đích/mục tiêu môn học (Course Purposes/Aims)

2.1 Về nội dung: cung cấp những tri thức có tính hệ thống, cơ bản về sự ra đời của Đảng Cộng sản Việt Nam (1920-1930), sự lãnh đạo của Đảng đối với cách mạng Việt Nam trong thời kỳ đấu tranh giành chính quyền (1930-1945), trong hai cuộc kháng chiến chống thực dân Pháp và đế quốc Mỹ xâm lược (1945-1975), trong sự nghiệp xây dựng, bảo vệ tổ quốc thời kỳ cả nước quá độ lên chủ nghĩa xã hội, tiến hành công cuộc đổi mới (1975-2018).

2.2 Về tư tưởng: Thông qua các sự kiện lịch sử và các kinh nghiệm về sự lãnh đạo của Đảng để xây dựng ý thức tôn trọng sự thật khách quan, nâng cao lòng tự hào, niềm tin đốivới sự nghiệp lãnh đạo của Đảng.

2.3 Về kỹ năng: Trang bị phương pháp tư duy khoa học về lịch sử, kỹ năng lựa chọn tài liệu nghiên cứu, học tập môn học và khả năng vận dụng nhận thức lịch sử vào công tác thực tiễn, phê phán quan niệm sai trái về lịch sử của Đảng.

3. Mô tả môn học (Course Outlines)

Môn học trang bị cho sinh viên những kiến thức cơ bản về Lịch sử Đảng Cộng sản Việt Nam

4. Tài liệu phục vụ học tập:

- Bộ Giáo dục và Đào tạo (2019), *Chương trình môn học Lịch sử Đảng Cộng sản Việt Nam,* ban hành 2019.
- Hội đồng Trung ương chỉ đạo biên soạn giáo trình quốc gia các môn khoa học Mác — Lênin, Tư tưởng Hồ Chí Minh (2018), *Giáo trình Lịch sử Đảng Cộng sản Việt Nam (tái bản có sửa chữa, bổ sung),* Nxb. Chính trị quốc gia, Hà Nội.

Chuẩn đầu ra	**Mô tả**	**Tiêu chí đánh giá**	**Mục tiêu môn học**	**Chuẩn đầu ra CDIO CTĐT**	**Mức độ giảng dạy (I/T/U)**
5.7. ***Kiến thức***					
LO.1	NHẬP MÔN ĐỐI TƯỢNG, CHỨC NĂNG, NHIỆM VỤ, NỘI DUNG VÀPHƯƠNG PHÁP NGHIÊN CỨU, HỌC TẬP LỊCH SỬ ĐẢNG CỘNG SẢN VIỆT NAM	LO. 1.1 - Nắm rõ được đối tượng, mục đích học tập, nghiên cứu và một số yêu cầu cơ bản về phương pháp học tập, nghiên cứu Lịch sử Đảng Cộng sản Việt Nam	2.1	1.1.3	13
LO.2	ĐẢNG CỘNG SẢN VIỆT NAM RA ĐỜI VÀ	LO.2.1 - Nắm được bối cảnh lịch sử tác động đến sự ra đời của Đảng Cộng sản Việt Nam	2.1	1.1.3	T4

	LÃNH ĐẠO ĐẤU TRANH GIÀNH CHÍNH QUYỀN (1930-1945)	LO.2.2 - Nắm được quá trình chuẩn bị các điều kiện để thành lập Đảng của Nguyễn Ái Quốc	2.1		
		LO.2.3- Nắm được nội dung hội nghị thành lập Đảng và Cương lĩnh chính trị đầu tiên của Đảng	2.1		
		LO.2.4 - Hiểu được ý nghĩa lịch sử của việc thành lập Đảng Cộng sản Việt Nam	2.1		
		LO.2.5 - Nắm rõ các phong trào cách mạng 1930-1935 và các chủ trương khôi phục phong trào năm 1932-1935	2.1		
		LO.2.6 - Nắm rõ phong trào dân chủ năm 1936-1939	2.1		
		LO.2.7 - Nắm rõ phong trào giải phóng dân tộc 1939--1945			
		LO.2.8 - Hiểu rõ tính chất, ý nghĩa và kinh nghiệm của Cách mạng Tháng Tám năm 1945	2.1		

LO.3	ĐẢNG LÃNH ĐẠO HAI CUỘC KHÁNG CHIẾN, HOÀN THÀNH GIẢI PHÓNG DÂN TỘC, THỐNG NHẤT ĐẤT NƯỚC (1945-1975)	LO.3.1 - Hiểu được chủ trương xây dựng và bảo vệ chính quyền cách mạng 1945-1946	2.1	1.1.3	T4
		LO.3.2 - Hiểu rõ Đường lối kháng chiến toàn quốc chống thực dân Pháp xâm lược và quá trình tổ chức thực hiện từ năm 1946-1950			

		LO.3.3 - Hiểu rõ chủ trương Đẩy mạnh cuộc kháng chiến chống thực dân Pháp xâm lược và quá trình tổ chức thực hiện từ năm 1946 đến năm 1950	2.1	1.1.3	T4
		LO.3.4 - Hiểu rõ được Ý nghĩa lịch sử và kinh nghiệm của Đảng trong lãnh đạo kháng chiến chống thực dân Pháp và can thiệp Mỹ			
		LO.3.5 - Nắm được quá trình lãnh đạo cách mạng hai miền giai đoạn 1954-1965 của Đảng	2.1		
		LO.3.6 - Nắm vững sự lãnh đạo cách mạng cả nước giai đoạn 1965-1975 của Đảng			
		LO.3.7 - Hiểu rõ Ý nghĩa và kinh nghiệm lãnh đạo của Đảng trong cuộc kháng chiến chống Mỹ, cứu nước 1954-1975			

5.2. Kỹ năng

LO.5	THỂ HIỆN KHẢ NĂNG KHÁI QUÁT HÓA, TƯ DUY, TRANH LUẬN, PHẢN BIỆN, LÀM VIỆC NHÓM	LO.5.1. Rèn luyện năng lực tư duy độc lập trong nghiên cứu đường lối, chiến lược, sách lược cách mạng của Đảng. LO.5.2. Có tư duy phê phán, kỹ năng phân tích, tổng hợp và đánh giá những vấn đề liên quan đến môn học. Từ đó, vận dụng kiến thức đã học để chủ động, tích cực nhận thức những vấn đề chính trị, kinh tế, văn hoá, xã hội theo đường lối, chính sách, pháp luật của Đảng	2.1 2.2 2.3	2.1.1 2.3.1 2.4.4 2.5 3.1.5	U4
5.3. Thái độ					
LO.6	THỂ HIỆN Ý THỨC, NHẬN THỨC TRONG VÀ SAU KHI HỌC TẬP	LO.6.1. Tin tưởng vào sự lãnh đạo của Đảng đối với cách mạng Việt Nam. LO.6.2. Quyết tâm phấn đấu thực hiện đường lối cách mạng của Đảng. LO.6.3. Có thái độ nghiêm túc trong học tập, nghiên cứu khoa học, trong nhận thức về cuộc sống, xã hội, tự rèn luyện bản thân trở thành người có phẩm chất, bản lĩnh chính trị vững vàng, có đạo đức, trình độ chuyên	2.1 2.2 2.3	3.1	U3
		Đảng từ năm 1930 đến 2018	2.2		

6. Kế hoạch giảng dạy môn học (Course Plan):

Buổi (3 tiết)	Nội dung giảng dạy	LO	Hoạt động dạy và học	Đánh giá

1	**Giới thiệu về môn học**	LO.l, LO.5;	**Dạy:** - Giới thiệu đề cương môn học - Giới thiệu nội dung đề tài thuyết trình nhóm GHW) **Học ở lớp:** - Chia nhóm (5 SV/nhóm) - Giới thiệu nhóm học tập **Học ngoài lớp:** - Chọn đề tài thuyết trình của	
2	**Chương nhập môn** ĐỐI TƯỢNG, CHỨC NĂNG, NHIỆM VỤ, NỘI DUNG VÀ PHƯƠNG PHÁP NGHIÊN CỨU, HỌC TẬP LỊCH SỬ ĐẢNG CỘNG SẢN VIỆT NAM	LO.l;	**Dạy:** I. ĐỐI TƯỢNG NGHIÊN CỨU CỦA MÔN HỌC LỊCH SỬ ĐẢNG CỘNG SẢN VIỆT NAM 1. Đối tượng nghiên cứu 2. Phạm vi nghiên cửu II.CHỨC NĂNG, NHIỆM VỤ CỦA MÔN HỌC LỊCH SỬ ĐẢNG CỘNG SẢN VIỆT NAM 1. Chức năng của khoa học Lịch sử Đảng 2. Nhiệm vụ của môn học II.PHƯƠNG PHÁP NGHIÊN CỨU, HỌC TẬP MÔN LỊCH SỬ ĐẢNG CỘNG SẢN VIỆT NAM 1. Phương pháp luận 2. Các phương pháp cụ thể **Học ở lớp:** Thảo luận và phát biểu trên lớp	Thi giữa kỳ (Quiz)

3	**Chương 1** ĐẢNG CỘNG SẢN VIỆT NAM RA ĐỜI VÀ LÃNH ĐẠO ĐẤU TRANH GIÀNH CHÍNH QUYỀN (1930-1945)	LO.2	**Dạy:** I. ĐẢNG CỘNG SẢN VIỆT NAM RA ĐỜI VÀ CƯƠNG LĨNH CHÍNH TRỊ ĐẦU TIÊN CỦA ĐẢNG (THÁNG 2-1930) 1. Bối cảnh lịch sử 2. Nguyễn Ái Quốc chuẩn bị các điều kiện để thành lập Đảng 3. Thành lập Đảng Cộng sản Việt Nam và Cương lĩnh chính trị đầu tiên của Đảng 4. Ý nghĩa lịch sử của việc thành lập Đảng Cộng sản Việt Nam II. ĐẢNG LÃNH ĐẠO ĐẤU TRANH GIÀNH CHÍNH QUYỀN (1930-1945) 1.Phong trào cách mạng 1930-1935 và khôi phục phong trào 1932-1935 2.Phong trào dân chủ 1936-1939 3.Phong trào giải phóng dân tộc 1939-1945	Thi giữa kỳ (Quiz) Thi cuối kỳ (FEX)

7. Đánh giá môn học

STT	Mã	Tên	Mô tả	Tỷ trọng	Hình thức	LO
1	GHW	Thuyết trình nhóm	Thuyết trình nhóm về đề tài đã phân công	20%	Thuyết trình và bản báo cáo nhóm	LO.3 LO.4 LO.5
2	Quiz	Bài thi giữa kỳ	Thi theo đề thi chung	30%	Tự luận	LO.l LO.2;

3	DIC	Thảo luận tại lớp (Discussion in Class)	Điểm thảo luận được tính theo phương pháp tương đối. SV có số lần thảo luận tại lớp nhiều nhất sẽ được điểm tối đa, điểm của các bạn khác được tính dựa theo bạn có số lần thảo luận cao nhất.	Cộng tối đa 1 điểm vào bài thi cuối kỳ	Phát biểu/đặt câu hỏi trên lớp hoặc phiếu trả lời trong các nghiên cứu tình huống tại lớp	
4	FEX	Thi cuối kỳ	Đề thi bao quát toàn bộ nội dung môn học	50%	Trắc nghiệm	LO.2; LO.3, LO.4;
			Tổng cộng	**100%**		

8. Tiêu chí đánh giá chuẩn đầu ra môn học

TT	Chuẩn đầu ra	Nội dung	Phương pháp	Tiêu chí đánh giá
LO.l	Nắm được đối tượng, mục đích học tập, nghiên cứu và một số yêu cầu cơ bản về phương pháp học tập, nghiên cứu	Chương nhập môn	Thi giữa kỳ (Quiz)	Ngân hàng đề thi của GV
LO.2	Hiểu rõ quá trình ra đời của Đảng Cộng sản Việt Nam (1920-1930), nội dung cơ bản, giá trị lịch sử của Cương lĩnh chính trị đầu tiên của Đảng và quá trình Đảng lãnh đạo cuộc đấu tranh giành độc lập, giành chính quyền (1930-1945)	Chương 1	Thi giữa kỳ (Quiz)	Ngân hàng đề thi của GV

LO.3 LO.5	Nắm rõ quá trình lãnh đạo của Đảng đối với hai cuộc kháng chiến chống thực dân Pháp và đế quốc Mỹ xâm lược, hoàn thành giải phóng dân tộc, thống nhất đất nước thời kỳ 1945-1975	Chương 2	Thuyết trình nhóm (GHW) Thi cuối kỳ (FEX)	Tiêu chí đanh giá thuyết trình nhóm Ngân hàng đề thi của GV
LO.4 LO.5	Hiểu được quá trình phát triển đường lối và sự lãnh đạo của Đảng đưa cả nước quá độ lên chủ nghĩa xã hội và tiến hành công cuộc đổi mới từ sau ngày thống nhất đất nước năm 1975 đến nay. Từ đó rút ra được những thắng lợi và những bài học kinh nghiệm trong quá trình lãnh đạo cách mạng của Đảng.	Chương 3	Thảo luận tại lớp (Discussion in Class) Thi cuối kỳ (FEX)	Ngân hàng đề của GV .

9. Một số lưu ý khác:

- Khi có các thắc mắc liên quan môn học, sinh viên có thể liên lạc với quản lý Bộ môn Hồ Chí Minh học & Lịch sử Đảng và Khoa Chính trị - Hành chính qua email: daotao.spas@vnuhcm.edu.vn
- Quy định về Bài thuyết trình nhóm GH
- Thành lập nhóm: 5 sinh viên/nhóm. Hạn chót đăng ký đề tài nhóm Quản lý trên forum là Buổi 2.

Tuần 4 thuyết trình theo thứ tự. Lưu ý các nhóm cần có mặt đủ và mang theo tất cả các tài liệu liên quan đến GHW khi đi thuyết trình.

Hình thức nộp bài: Nộp file và biên bản làm việc nhóm qua mail cho GV

- Quy định về giờ giấc, chuyên cần, kỷ luật trong khóa học: Lên lớp đúng giờ, dự tối thiểu 80% thời gian học trên lớp (chỉ được phép vắng mặt tối đa 20% số tiết học). Nếu vắng quá số tiết quy định sẽ bị cấm thi theo quy chế. Có đầy đủ điểm kiểm tra, điểm thi kết thúc học phần & nhiệt tình thảo luận, phát biểu xây dựng bài, nghiêm túc trong giờ học.

Course Name: Internship

Course Code: IT082IU

1. **General information**

Course designation	This course helps students to do an internship in industry and prepare a topic for a pre-thesis and thesis
Semester(s) in which the course is taught	7
Person responsible for the course	Lecturer of School of Computer Science and Engineering; Advisor of the Company/Organization (in Industry)
Language	English
Relation to curriculum	Compulsory
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	Total workload: 90 hours Private study including examination preparation, specified in hours: 90
Credit points	Number of credits : 3 Lecture: 0 Laboratory: 3
Required and recommended prerequisites for joining the course	Follows requirements of the academic program
Course objectives	This course requires students to work in IT-related organizations or businesses from June to September. Each student has supervised by a faculty member at the School and an instructor at the organization. The student will join/run a technical project, and/or participate in soft skills courses. The internship lasts minimum 8 weeks and 3 sessions per week. Students have to report progress to instructors after 3 weeks of receiving the project. Depending on the project requirements of the organization or business, students may arrange for longer time. At the end of the internship, students will submit internship reports and assessment reports from the instructor at the organization or business to the School. Instructors read the reports and confirm the internship marks for the students. Students can also register this course in main semesters or take part in internships abroad for a period of 6 months. The registration and evaluation process are similar.
Course learning outcomes	CLO 1. Recognize the roles of an engineer in practical environment.

<table>
<tr><td></td><td>CLO 2. Develop practical products or run product development projects in industry
CLO 3. Follow requirements/regulations and laws
<table>
<tr><th>Competency level</th><th>Course learning outcome (CLO)</th></tr>
<tr><td>Knowledge</td><td>CLO1, CLO2</td></tr>
<tr><td>Skill</td><td>CLO1, CLO2</td></tr>
<tr><td>Attitude</td><td>CLO3</td></tr>
</table></td></tr>
<tr><td>Content</td><td>The description of the contents should clearly indicate the weighting of the content and the level.
Weight: within 3 months
Teaching levels: I (Introduce); T (Teach); U (Utilize)
<table>
<tr><th>Topic</th><th>Weight</th><th>Level</th></tr>
<tr><td>Introduction of the internship place</td><td>9</td><td>U</td></tr>
<tr><td>Review the existing issues of an assigned project</td><td>9</td><td>U</td></tr>
<tr><td>Study and solve some issues in product development</td><td>9</td><td>U</td></tr>
<tr><td>Implement some new functions or features for the project product</td><td>9</td><td>U</td></tr>
<tr><td>Presentation</td><td>9</td><td>U</td></tr>
</table></td></tr>
<tr><td>Examination forms</td><td>Multiple-choice questions, short-answer questions</td></tr>
<tr><td>Study and examination requirements</td><td>Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.
Assignments/Examination: Students must have more than 50/100 points overall to pass this course.</td></tr>
<tr><td>Reading list</td><td></td></tr>
</table>

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-3) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO					
CLO	1	2	3	4	5	6
1		X				X
2		X				X
3				X	X	

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources

1	Introduction of the internship place	1,2	Check and Evaluate	Research and working	At company or organization
3	Review the existing issues of an assigned project	1,2	Check and Evaluate	Research and working	At company or organization
4	Study and solve some issues in product development	1,2	Check and Evaluate	Research and working	At company or organization
5	Implement some new functions or features for the project product	1,2	Check and Evaluate	Research and working	At company or organization
6	Presentation	1,2,3	Check and Evaluate	Research and working	At company or organization
7	**Final grade**				

4. **Assessment plan**

Assessment Type	**CLO1**	**CLO2**	**CLO3**
Final grade (100%)	30%	40%	30%

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. **Rubrics (optional)**

5.1. Grading checklist

Grading checklist for Written Reports			
Student: …….. Date: ……	HW/Assignment: ……. Evaluator: ……		
	Max.	**Score**	**Comments**
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		

Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)	10		
TOTAL SCORE	100		

5.2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	**Description**
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	Issue/ problem to be considered critically is stated without clarification or description.

Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation / evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective,	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.

	thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	(perspective, thesis/ hypothesis).		
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequence s and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequence s and implications) are oversimplifie d.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.

	presentation cohesive.			
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities)	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference

	make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022

Dean of School of Computer Science and Engineering

Assoc.Prof. Nguyen Van Sinh

Course Name: Artificial Intelligence

Course Code: IT159

1. General information

Course designation	This subject introduces the students to the principles and fundamental algorithms of Artificial Intelligence, the use cases and the related processes in Artificial Intelligence.
Semester(s) in which the course is taught	6,8
Person responsible for the course	Dr. Nguyen Trung Ky
Language	English
Relation to curriculum	Elective
Teaching methods	Lecture, lesson, project, laboratory.
Workload (incl. contact hours, self-study hours)	Total workload: 195 Contact hours: 45 hours (lectures) + 30 hours (laboratory) Private study including examination preparation, specified in hours: 120
Credit points	Number of credits: 4 Lecture: 3 Laboratory: 1
Required and recommended prerequisites for joining the course	Object-Oriented Programming Algorithms and Data Structures Discrete Mathematics Probability, Statistic & Random Process
Course objectives	This course introduces students to the basic knowledge on Artificial Intelligence. Artificial intelligence (AI) is a research field that studies how to realize the intelligent human behaviors on a computer. The ultimate goal of AI is to make a computer that can learn, plan, and solve problems autonomously. In this course, student will learn the foundational principles and practice implementing some of these applications including representation, problem solving, and learning methods of artificial intelligence. Accordingly, students should be able to develop intelligent systems by assembling solutions to concrete computational problems; understand the role of knowledge representation, problem solving, and learning in intelligent-system engineering; and appreciate the role of problem solving, vision, and language in understanding human intelligence from a computational perspective.
Course learning outcomes	

Competency level	**Course learning outcome (CLO)**

	Knowledge	CLO 1. Apply knowledge of AI techniques and synthesize solutions to the discipline and ability to develop a range of typical applications using artificial intelligence methods CLO 2. Represent knowledge corresponding to practical problems, design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs by properly using classical search algorithms, including breadth-first, depth-first, A*, and heuristic search
	Skill	CLO 3. Produce intelligent applications of machine learning with statistical learning methods (Naive Bayes), supervised and unsupervised learning models: decision tree, neural networks, single-layer (perceptron) and multilayer networks CLO 4. Communicate effectively with a range of audiences, ability to use current techniques, skills, and tools necessary for computing practice, ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the trade-offs involved in design choices and ability to apply design and development principles in the construction of software systems of varying complexity
	Attitude	

Content

The description of the contents should clearly indicate the weighting of the content and the level.

Weight: lecture session (~~3~~ hours)

Teaching levels: I (Introduce); T (Teach); U (Utilize)

Topic	**Weight**	**Level**
Introduction and Intelligent Agents	1	I
States and Searching: Uninformed Search	1	T, U
States and Searching: Informed and More Sophisticated Search	1	T, U
Features and Constraints: Constraint Satisfaction Problems	1	T, U
Features and Constraints: Constraint Satisfaction Problems (continue)	1	T, U
Reasoning Under Uncertainty:	1	T, U

	• Random Variables and Events • Joint and Marginal Distributions • Conditional Distribution • Product Rule, Chain Rule, Bayes' Rule • Inference		
	Reasoning Under Uncertainty: Naïve Bayes Classifier (continue)	1	T, U
	Supervised Learning: Neural Networks	1	T, U
	Supervised Learning: Neural Networks (continue)	1	T, U
	Supervised Learning: Support Vector Machine	1	T, U
	Supervised Learning: Support Vector Machine in Mathematics	1	T, U
	Beyond Supervised Learning: Kernels and Clustering	1	T, U
	Beyond Supervised Learning: Kernels and Clustering (continue)	1	T, U
	Gaussian Mixture Model and Expectation-Maximization Algorithm	1	T, U
	Revision	1	
Examination forms	Multiple-choice questions, short-answer questions		
Study and examination requirements	Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. Assignments/Examination: Students must have more than 50/100 points overall to pass this course.		
Reading list	[1] Stuart Russell and Peter Norvig, *"Artificial Intelligence: A Modern Approach"*, Fourth Edition, 2020. [2] David L. Poole and Alan K. Mackworth, *"Artificial Intelligence Foundations of Computational Agents"*, Second Edition, 2017.		

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO					
CLO	1	2	3	4	5	6
1	x	x				
2		x				x

3		x				x
4	x	x				x

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
1	Introduction and Intelligent Agents	1, 2	Quiz	Lecture, Discussion	[1]. Chapter 1, 2 [2]. Chapter 1
2	States and Searching: Graph Searching Techniques	1, 2	Quiz	Lecture, In-class quiz	[1]. Chapter 3
3	States and Searching: Heuristic Search and More Sophisticated Search	1, 2	Quiz	Lecture, In-class quiz	[1]. Chapter 3
4	Features and Constraints: Constraint Satisfaction Problems	1, 2	Quiz	Lecture, In-class quiz	[1]. Chapter 6
5	Features and Constraints: Constraint Satisfaction Problems (continue)	1, 2	Quiz	Lecture, In-class quiz	[1]. Chapter 6
6	Reasoning Under Uncertainty	3, 4	Quiz	Lecture, In-class quiz	[1]. Chapter 12
7	Reasoning Under Uncertainty (continue)	3, 4	Quiz	Lecture, In-class quiz	1]. Chapter 12
8	**Midterm**				
9	Supervised Learning: Neural Networks	3, 4	Quiz	Lecture, In-class quiz	[1]. Chapter 19 [2]. Chapter 20
10	Supervised Learning: Neural Networks (continue)	3, 4	Quiz	Lecture, In-class quiz	[1]. Chapter 19 [2]. Chapter 20
11	Supervised Learning: Support Vector Machine	3, 4	Quiz	Lecture, In-class quiz	[1]. Chapter 19 [2]. Chapter 15
12	Supervised Learning: Support Vector Machine in Mathematics (continue)	3, 4	Quiz	Lecture, In-class quiz	[1]. Chapter 19 [2]. Chapter 15

13	Beyond Supervised Learning: Kernels and Clustering	3, 4	Quiz	Lecture, In-class quiz	[1]. Chapter 21 [2]. Chapter 16, 22
14	Beyond Supervised Learning: Kernels and Clustering (continue)	3, 4	Quiz	Lecture, In-class quiz	[1]. Chapter 21 [2]. Chapter 16, 22
15	Gaussian Mixture Model and Expectation-Maximization Algorithm	3, 4	Quiz	Lecture, Discussion	[1]. Chapter 20 [2]. Chapter 24
16	Revision			Review-test	
17	**Final exam**				

4. Assessment plan

Assessment Type	**CLO1**	**CLO2**	**CLO3**
Labs (20%)		50%	50%
Midterm examination (30%)	50%	50%	
Final examination (40%)		100%	
Exercises/ Quiz (10%)	50%	50%	

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

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1. When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.↩

Rubrics (optional)

1. Grading checklist

Grading checklist for Written Reports			
Student: ……..	HW/Assignment: …….		
Date: ……	Evaluator: ……		
	Max.	**Score**	**Comments**
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		

Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)	10		
TOTAL SCORE	100		

2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	**Description**
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermine	Issue/ problem to be considered critically is stated without clarification or description.

			d, and/ or backgrounds unknown.	
Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation / evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into	Specific position (perspective, thesis/hypothesis) takes into account the complexities of	Specific position (perspective, thesis/ hypothesis) acknowledges different	Specific position (perspective, thesis/ hypothesis) is stated, but is

	account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	sides of an issue.	simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequence s and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequence s and implications) are oversimplifie d.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable

	consistently observable and is skillful and makes the content of the presentation cohesive.	consistently observable within the presentation.	observable within the presentation.	within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities)

	authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022

Dean of School of Computer Science and Engineering

Assoc.Prof. Nguyen Van Sinh

Course Name: Scalable and Distributed Computing

Course Code: IT139

1. General information

Course designation	Fundamental concepts in distributed computing and discuss system designs enabling distributed applications
Semester(s) in which the course is taught	5,7
Person responsible for the course	Assoc. Prof. Vo Thi Luu Phuong
Language	English
Relation to curriculum	Compulsory (NE, DS)
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	Total workload: 195 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 45 (lecture) + 30 (laboratory) Private study including examination preparation, specified in hours: 120
Credit points	Number of credits : 4 Lecture: 3 Laboratory: 1
Required and recommended prerequisites for joining the course	Algorithms and Data Structure Fundamentals of Programming or C/C++ Programming
Course objectives	This course presents the theory, design, implementation, and analysis of distributed systems. Through classroom lectures, labs, projects and exercises, students learn the fundamentals of distributed systems, system models, remote procedure call, distributed objects, operating system support, security in distributed systems, distributed file systems, concurrency, transaction and synchronization, replication. The course also covers advanced topics related to cloud and distributed data processing technologies: data partitioning, storage schemes, stream processing, and parallel algorithms. Course introduces some modern Internet and cloud computing services running on multiple geographically distributed data centers: Google, Yahoo, Facebook, iTunes, Amazon, eBay, Bing, etc.
Course learning outcomes	CLO 1. Understand the concept and design of distributed systems CLO 2. Apply distributed data processing models and technologies

<table>
<tr><td></td><td>CLO 3. Communicate to the team to design the data pipeline that can be integrated with distributed system,
CLO 4. Design and implement components of a scalable and distributed system (millions of users and petabytes of data)
<table>
<tr><th>Competency level</th><th>Course learning outcome (CLO)</th></tr>
<tr><td>Knowledge</td><td>CLO 1, CLO 2, CLO 3, CLO 4</td></tr>
<tr><td>Skill</td><td>CLO 2, CLO 4</td></tr>
<tr><td>Attitude</td><td>CLO 3</td></tr>
</table></td></tr>
<tr><td>Content</td><td>The description of the contents should clearly indicate the weighting of the content and the level.
Weight: lecture session (~~3~~ hours)
Teaching levels: I (Introduce); T (Teach); U (Utilize)
<table>
<tr><th>Topic</th><th>Weight</th><th>Level</th></tr>
<tr><td>Introduction to Distributed Systems, System Models</td><td>1</td><td>I, T</td></tr>
<tr><td>Remote Procedure Call, Distributed Objects</td><td>1</td><td>I, T</td></tr>
<tr><td>Operating System Support, Distributed File Systems</td><td>1</td><td>I, T</td></tr>
<tr><td>Transaction and Synchronization</td><td>1</td><td>T, U</td></tr>
<tr><td>Concurrency Control</td><td>1</td><td>T, U</td></tr>
<tr><td>Security</td><td>1</td><td>T, U</td></tr>
<tr><td>Fault and Failure</td><td>1</td><td>T, U</td></tr>
<tr><td>Introduction to MapReduce</td><td>1</td><td>T, U</td></tr>
<tr><td>Scalable K-means algorithms</td><td>1</td><td>T, U</td></tr>
<tr><td>Graph and Random-walk algorithms</td><td>1</td><td>T, U</td></tr>
<tr><td>Web services, XML, JSON, Node.js</td><td>1</td><td>T, U</td></tr>
<tr><td>Peer-to-Peer</td><td>1</td><td>I, T</td></tr>
<tr><td>Selected seminar 1: Introduce some distributed pipeline in Industry.</td><td>1</td><td>I</td></tr>
<tr><td>Selected seminar 2: Introduce some scalable and distributed products used in Industry.</td><td>1</td><td>I</td></tr>
</table></td></tr>
<tr><td>Examination forms</td><td>Multiple-choice questions, short-answer questions</td></tr>
<tr><td>Study and examination requirements</td><td>Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.
Assignments/Examination: Students must have more than 50/100 points overall to pass this course.</td></tr>
</table>

Reading list	1. G. Coulouris, J. Dollimore, T. Kindberg, G. Blair, Distributed Systems: Concepts and Design 5th, 2011 2. T. White, Hadoop: The Definitive Guide 4th, 2015 3. A.S. Tanenbaum, M.V. Steen, Distributed Systems: Principles and Paradigms 2nd, 2007

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO					
CLO	1	2	3	4	5	6
1	x					
2	x	x				
3	x	x				x
4		x				x

3. Planned learning activities and teaching methods

Week	**Topic**	**CLO**	**Assessments**	**Learning activities**	**Resources**
1	Introduction to Distributed Systems, System Models	1		Lecture, Discussion	[1,2,3] Chapter 1
2	Remote Procedure Call, Distributed Objects	1	Exercises	Lecture, In-class exercises	[1,3] Chapter 2
3	Operating System Support, Distributed File Systems	1	Exercises	Lecture, In-class exercises	[1,3] Chapter 3
4	Transaction and Synchronization	1,2	Labs	Lecture, In-class exercises	[1,3] Chapter 3,4
5	Concurrency Control	1,2	Labs	Lecture, In-class exercises	[1,3] Chapter 5,6
6	**Midterm**				
7	Security	2,3	Exercises	Lecture, In-class exercises	[1,3] Chapter 6,7
8	Fault and Failure	2,3	Labs	Lecture, In-class exercises	[2] Chapter 5

9	Introduction to MapReduce	2,3	Exercises	Lecture, In-class exercises	[2] Chapter 6,7
10	Scalable K-means algorithms	2,3	Labs	Lecture, In-class exercises	Outside resources
11	Graph and Random-walk algorithms	2,3	Exercises	Lecture, In-class exercises	Outside resources
12	Web services, XML, JSON, Node.js	3,4	Labs	Lecture, In-class exercises	[1,3] Chapter 9,10,11
13	Peer-to-Peer	3,4	Labs	Lecture, In-class exercises	[1,3] Chapter 12
14	Selected seminar 1: Introduce some distributed pipeline in Industry.	4		Discussion	Outside resources
15	Selected seminar 2: Introduce some scalable and distributed products used in Industry.	4		Discussion	Outside resources
16	Revision			Review-test	
17	**Final exam**				

4. Assessment plan

Assessment Type	**CLO 1**	**CLO 2**	**CLO 3**
Labs (20%)		50%	50%
Midterm examination (30%)	50%	50%	
Final examination (40%)	20%	50%	30%
Exercises/ Quiz (10%)	50%	50%	

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

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1. When calculating contact time, each contact hour is counted as a full hour because the organization of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.↩

Rubrics (optional)

5.1. Grading checklist

Grading checklist for Written Reports

Student: …… HW/Assignment: ……. Date: …… Evaluator: ……			
	Max.	**Score**	**Comments**
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)	10		
TOTAL SCORE	100		

5.2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	**Description**
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**

Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	Issue/ problem to be considered critically is stated without clarification or description.
Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation/ evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when

				presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**

Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.

Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022

Dean of School of Computer Science and Engineering

Assoc.Prof. Nguyen Van Sinh

Course Name: Physics 4 (Wave and Modern Physics)

Course Code: PH012

1. General information

1. Course designation	
Semester(s) in which the course is taught	3,5,6,7,8
Person responsible for the course	Do Xuan Hoi , Dr.
Language	English
Relation to curriculum	Compulsory / elective / specialisation Names of other study programmes with which the module is shared
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: Contact hours (please specify whether lecture, exercise, laboratory session, etc.): Private study including examination preparation, specified in hours: Student responsibility: Students are expected to spend at least 8 hours per week for self – studying. This time should be made up of reading, working on exercises and problems and group assignment.
Credit points	Number of credits : 2 Lecture: 2 Laboratory: 0
Required and recommended prerequisites for joining the course	Physics 1 (general mechanics
Course objectives	This course provides students with basic knowledge of Wave and Modern Physics
Course learning outcomes	CLO 1. Construct the basic knowledge of Wave and Modern Physics CLO 2. Solve problems in engineering environment by applying both theoretical and experimental techniques CLO 3. Understand and acquire skills needed to use physical laws governing real process and to solve them in the engineering environment CLO 4. Develop confidence and fluency in discussing physics in English.

Competency level	**Course learning outcome (CLO)**
Knowledge	
Skill	
Attitude	

Content	*The description of the contents should clearly indicate the weighting of the content and the level.* Weight: lecture session (3 hours) Teaching levels: I (Introduce); T (Teach); U (Utilize)

Topic	**Weight**	**Level**
Chapter 1: Vibration and Mechanical Wave		
Chapter 2: Properties of Light		
Chapter 3 Introduction to Quantum Physics		
Chapter 4: Atomic Physics		
Chapter 5: Relativity and Nuclear Physics		

Examination forms	Multiple-choice questions, short-answer questions
Study and examination requirements	Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. Assignments/Examination: Students must have more than 50/100 points overall to pass this course.
Reading list	1. Halliday D., Resnick R. , Walker, J, Fundamentals of Physics 9th, 2011 2. Hecht, E., Physics: Calculus 2nd, 2000

2. Learning Outcomes Matrix (optional)

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	1	2	3	4	5	6
1	✓					
2	✓					
3	✓					
4	✓					

3. Planned learning activities and teaching methods

Week	**Topic**	**CLO**	**Assessments**	**Learning activities**	**Resources**
1	Chapter 1: Vibration and Mechanical Wave				
2	**Midterm**				
3	Chapter 2: Properties of Light				

4	Chapter 3 Introduction to Quantum Physics				
5	Chapter 4: Atomic Physics				
6	Chapter 5: Relativity and Nuclear Physics				
7	**Final exam**				

4. Assessment plan

Assessment Type

Assessment Type	**CLO1**	**CLO2**	**CLO3**	**CLO4**
Homework/ Assigment (20%)			50%	50%
Midterm examination (20%)	100%			
Final examination (60%)		100%	50%	50%

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

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1. When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.↩

Rubrics (optional)

1. Grading checklist

Grading checklist for Written Reports			
Student: …….. Date: ……	HW/Assignment: ……. Evaluator: ……		
	Max.	**Score**	**Comments**
Technical content (60%)			
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Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		

Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)	10		
TOTAL SCORE	100		

2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	**Description**
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
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2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

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Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective,	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.

	thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	(perspective, thesis/ hypothesis).		
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequence s and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequence s and implications) are oversimplifie d.

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Oral communication value rubric for evaluating presentation tasks:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.

	presentation cohesive.			
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities)	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference

	make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Course Name: Ho Chi Minh's Thoughts

Course Code: PE019IU

1. Thông tin chung	
Tên môn học (tiếng	Tư tưởng Hồ Chí Minh
Tên môn học (tiếng	Ho Chi Minh's Thoughts
Mã số môn học:	PE019IU
Thuộc khối kiến thức:	Cơ sở
Số tín chỉ:	2
Số tiết lý thuyết:	*20 (trên lớp)*
Số tiết thực	*10 (trên lớp)*
Số tiết tự học:	*90 (về nhà)*
Môn học trước:	1. Triết học Mác - Lênin, 2. Kinh tế chính trị Mác - Lênin, 3. Chủ nghĩa xã hội khoa học

Giảng viên phụ trách Khoa Chính trị - Hành chính, ĐHQG-HCM

2. Mục đích/mục tiêu môn học (Course Purposes/Aims)

2.1. Về kiến thức: Trang bị cho sinh viên những kiến thức cơ bản vê khái niệm, nguồn gốc, quả trình hình thành và phát triển tư tưởng Hồ Chí Minh; những nội dung cơ bản của tư tưởng Hồ Chí Minh; sự vận dụng của Đảng Cộng sản Việt Nam trong cách mạng dân tộc dân chủ và cách mạng xã hội chủ nghĩa, trong công cuộc đổi mới đất nước hiện nay.

2.2. Về kỹ năng: Giúp cho sinh viên khả năng tư duy, phân tích, đánh giá, vận dụng sáng tạo tư tưởng Hồ Chí Minh vào giải quyết các vấn đề trong thực tiễn đời sống, học tập và công tác.

2.3. Về thái độ: Giúp sinh viên nâng cao về bản lĩnh chính trị, yêu nước, trung thành với mục tiêu, lý tưởng độc lập dân tộc gắn liền với chù nghĩa xã hội; nhận thức được vai trò, giá trị của tư tưởng Hồ Chí Minh đối với Đảng và dân tộc Việt Nam; thấy được trách nhiệm của bản thân trong việc học tập, rèn luyện để góp phần vào xây dựng và bảo vệ Tổ quốc.

3. Mô tả môn học (Course Outlines)

Môn học trang bị cho sinh viên những kiến thức cơ bản về: Đối tượng, phương pháp nghiên cứu và ý nghĩa học tập môn tư tưởng Hồ Chí Minh; về cơ sở, quá trình hình thành và phát triển tư tưởng Hồ Chí Minh; về độc lập dân tộc và chủ nghĩa xã hội; về Đảng Cộng sản và Nhà nước Việt Nam; về đại đoàn kết dân tộc và đoàn kết quốc tế; về văn hóa, đạo đức, con người.

4. Tài liệu phục vụ học tập:

- Bộ Giáo dục và Đào tạo (2019), *Giảo trình Tư tưởng Hồ Chí Minh,* Nxb. Chỉnh trị quốc gia, Hà Nội.
- Khoa Chính trị - Hành chính, ĐHQG-HCM, *Tài liệu hướng dẫn học tập Tư tưởng Hồ Chí Minh*
- Hồ Chí Minh (2011), *Toàn tập,* Nxb. Chính trị quốc gia Sự thật, Hà Nội.
- Hồ Chí Minh (2016), *Biên niên tiểu sử,* Nxb. Chính trị quốc gia Sự thật, Hà Nội.

5. Chuẩn đầu ra môn học (Course Learning Outcomes)

Chuẩn đầu ra	Mô tả	Tiêu chí đánh giá	Mục tiêu môn học	Chuẩn đầu ra CDIO CTĐT	Mức độ giảng dạy (I/T/U)
5.1. Kiến thức					
LO.1	KHÁI NIỆM ĐỐI TƯỢNG PHƯƠNG PHÁP NGHIÊN CỨU VÀ Ý NGHĨA HỌC TẬP MÔN TƯ TƯỞNG HỒ CHÍ MINH	LO.1.1 - Nắm được khái niệm tư tưởng Hồ Chí Minh LO.1.2 - Nắm rõ được đối tượng nghiên cứu LO.1.3 - Nắm được một số yêu cầu cơ bản về phương pháp học tập, nghiên cứu môn học tư tưởng Hồ Chí Minh LO.1.4 - Nắm được ý nghĩa học tập, nghiên cứu môn học tư tưởng đối với sinh viên	2.1 2.1 2.1 2.1	1.1.3	I3
LO.2	CƠ SỞ QUÁ TRÌNH HÌNH THÀNH VÀ PHÁT TRIỂN TƯ TƯỞNG HỒ CHÍ MINH	LO.2.1 - Hiểu rõ được cơ sở thực tiễn, tiền đề lý luận và nhân tố chủ quan hình thành tư tưởng Hồ Chí Minh LO.2.2 - Hiểu rõ được quá trình hình thành và phát triển tư tưởng Hồ Chí Minh LO.2.3 - Nắm được giá trị tư tưởng Hồ Chí Minh đối với cách mạng Việt Nam và sự phát triển tiến bộ của nhân loại	2.1 2.1 2.1	1.1.3	I4
LO.3	TƯ TƯỞNG HỒ CHÍ MINH VỀ ĐỘC LẬP DÂN TỘC VÀ CHỦ NGHĨA XÃ HỘI	LO.3.1 - Nhận thức được bản chất khoa học, cách mạng và những sáng tạo tư tưởng Hồ Chí Minh về độc lập dân tộc và cách mạng giải phóng dân tộc. LO.3.2 - Nắm được quan điểm của Hồ Chí Minh về tính tất yếu di lên chủ nghĩa xã hội, xây dựng chủ nghĩa xã hội và thời kỳ quá độ lên chủ nghĩa xã hội ở Việt Nam.	2.1 2.1	1.1.3	T4

		LO.3.3 - Nắm được quan điểm Hồ Chí Minh về mối quan hệ giữa độc lập dân tộc và chủ nghĩa xã hội. LO.3.4 - Vận dụng tư tưởng Hồ Chí Minh về độc lập dân tộc gắn liền với chủ nghĩa xã hội trong sự nghiệp cách mạng hiện nay.	2.1 2.1		
LO.4	TƯ TƯỞNG HỒ CHÍ MINH VỀ ĐẢNG CỘNG SẢN VIỆT NAM VÀ NHÀ NƯỚC CỦA NHÂN DÂN, DO NHÂN DÂN, VÌ NHÂN DÂN	LO.4.1 - Nắm được nội dung cơ bản tư tưởng Hồ Chí Minh về Đảng Cộng sản Việt Nam. LO.4.2 - Nắm được nội dung cơ bản tư tưởng Hồ Chí Minh về nhà nước của nhân dân, do nhân dân, vì nhân dân. LO.4.3 - Vận dụng tư tưởng Hồ Chí Minh vào công tác xây dựng Đảng và xây dựng Nhà nước.	2.1 2.1 2.1	1.1.3	I4 I4 T4
LO.5	TƯ TƯỞNG HỒ CHÍ MINH VỀ ĐẠI ĐOÀN KẾT TOÀN DÂN TỘC VÀ ĐOÀN KẾT QUỐC TẾ	LO.5.1 - Hiêu được những quan điểm cơ bản của tư tưởng Hồ Chí Minh về đại đoàn kết toàn dân tộc. LO.5.2 -Hiểu được những quan điểm cơ bản của tư tưởng Hồ Chí Minh về đoàn kết quốc tế LO.5.3 - Vận dụng tư tưởng Hồ Chí Minh về đại đoàn kết dân tộc và đoàn kết quốc tế trong giai đoạn hiện nay	2.1 2.1 2.1	1.1.3	I4 T4
LO.6	TƯ TƯỞNG HỒ CHÍ MINH VỀ VĂN HÓA, ĐẠO ĐỨC, CON NGƯỜI	LO.6.1 - Nắm được kiến thức cơ bản tư tưởng Hồ Chi Minh về văn hóa. LO.6.2 - Nắm được kiến thức cơ bản tư tưởng Hồ Chí Minh về đạo đức mới (đạo đức cách mạng). LO.6.3 - Nắm được kiến thức cơ bản tư tưởng Hồ Chí Minh về văn hóa.	2.1 2.1 2.1	1.1.3	I4 I4

		LO.6.4 - Vận dụng tư tưởng Hồ Chí Minh về văn hóa, đạo đức, con người trong việc xây dựng văn hóa, đạo đức, con người Việt Nam hiện nay.	2.1		T4
5.2. Kỹ năng					
LO.7	THỂ HIỆN KHẢ NĂNG TƯ DUY, PHÂN TÍCH, ĐÁNH GIÁ, TRANH LUẬN, PHẢN BIỆN, LÀM VIỆC NHÓM	LO.7.1 Có kỹ năng tư duy, phân tích, đánh giá tư tưởng Hồ Chí Minh. LO.7.2. Có kỹ năng trình bày, thuyết minh, phản biện, tranh luận, hùng biện những tri thức lý luận đang học tập, nghiên cứu dựa trên thực tiễn LO.7.3. Có kỹ năng vận dụng sáng tạo tư tưởng Hồ Chí Minh vào giải quyết các vấn đề trong thực tiễn đời sống, học tập và công tác.	2.2 2.2 2.2	2.1.1 2.3.1 2.4.4 2.5	U4
5.3. Thái độ					
LO.8	THỂ HIỆN Ý THỨC, NHẬN THỨC TRONG VÀ SAU KHI HỌC TẬP	LO.6.1. Nhận thức được vai trò, giá trị của tư tưởng Hồ Chí Minh đối với Đảng và dân tộc Việt Nam. LO.6.2. Có bản lĩnh chính trị, yêu nước, trung thành với mục tiêu, lý tưởng độc lập dân tộc gắn liền với chủ nghĩa xã hội LO.6.3. Thấy được trách nhiệm của bản thân trong việc học tập, nghiên cứu, vận dụng trong cuộc sống, góp phần vào sự nghiệp xây dựng và bảo vệ Tổ quốc	2.3 2.3 2.3	3.1	U3

6. Kế hoạch giảng dạy theo buổi học (Course Plan):

Buổi (3 tiết)	Nội dung giảng dạy	LO	Hoạt động dạy và học	Đánh giá
1		LO.1,	**Dạy:**	
1 (tiết)	Giới thiệu về môn học	LO.5,	- Giới thiệu đề cương môn - Giới thiệu nội dung đề tài thuyết trình nhóm GHW). **Học ở lớp:** - Chia nhóm (5 sv/nhóm) - Giới thiệu nhóm học tập **Học ngoài lớp:** - Chọn đề tài thuyết trình của nhóm (GHW), - Đọc trước tài liệu chương 1.	
2	**Chương 1** KHÁI NIỆM, ĐỐI TƯỢNG, PHƯƠNG PHÁP NGHIÊN CỨU VÀ Ý NGHĨA HỌC TẬP MÔN TƯ TƯỞNG HỒ CHÍ MINH	LO.1;	**Dạy:** I. KHÁI NIỆM TƯ TƯỞNG HỒ CHÍ MINH II. ĐỐI TƯỢNG NGHIÊN CỨU MÔN HỌC TƯ TƯỞNG HỒ CHÍ MINH III. PHƯƠNG PHÁP NGHIÊN CỨU 3. Phương pháp luận của việc nghiên cứu tư tưởng Hồ Chí Minh 4. Một số phương pháp cụ thể IV. Ý NGHĨA CỦA VIỆC HỌC TẬP MÔN HỌC TƯ TƯỞNG HỒ CHÍ MINH 1. Góp phần nâng cao năng lực tư duy lý luận 2. Giáo dục và thực hành đạo đức cách mạng, củng cố niềm tin khoa học gắn liền với trau dồi tình cảm cách mạng, bồi dưỡng lòng yêu nước 3.Xây dựng, rèn luyện phương pháp và phong cách công tác. **Học ở lớp**: Trao đổi, phát biểu trên lớp **Học ngoài lớp:** - Phác thảo nội dung thuyết trình nhóm GHW - Đọc trước tài liệu chương 2	

3	**Chương 2** CƠ SỞ, QUÁ TRÌNH HÌNH THÀNH VÀ PHÁT TRIỂN TƯ TƯỞNG HỒ CHÍ MINH	LO.2	**Dạy:** I. CƠ SỞ HÌNH THÀNH TƯ TƯỞNG HỒ CHÍ MINH 1. Cơ sở thực tiễn 2. Cơ sở lý luận 3.Nhân tố chủ quan II.QUÁ TRÌNH HÌNH THÀNH VÀ PHÁT TRIỂN TƯ TƯỞNG HỒ CHÍ MINH 1.Thời kỳ trước ngày 5-6¬1911: Hình thành tư tưởng yêu nước và có chí hướng tìm con đường mới 2.Thời kỳ từ năm 1911 đến cuối năm 1920: Dần dần hình thành tư tưởng cứu nước, giải phóng dân tộc Việt Nam theo con đường cách mạng vô sản 3; Thời kỳ từ cuối năm 1920 đến đầu năm 1930: Hình thành những nội dung cơ bản tư tưởng về cách mạng Việt Nam 4. Thời kỳ đầu năm 1930 đến đầu năm 1941: Vượt qua thử thách, giữ vững đường lối, phương pháp cách mạng Việt Nam đúng đắn, sáng tạo 5.Thời kỳ từ đầu năm 1941 đến tháng 9 - 1969: Tư tưởng Hồ Chí Minh tiếp tục phát triển, hoàn thiện, soi đường cho sự nghiệp cách mạng của Đảng và nhân dân ta III.GIÁ TRỊ TƯ TƯỞNG HỒ CHÍ MINH 1.Đối với cách mạng Việt Nam 2.Đối với sự phát triển tiến bộ của nhân loại **Học ở lớp**: Thảo luận và phát biểu trên lớp **Học ngoài lớp**: Đọc trước tài liệu chương 3	Thi giữa kì (Quiz) Thi cuối kì (FEX)

4	**Chương 3** TƯ TƯỞNG HỒ CHÍ MINH VỀ ĐỘC LẬP DÂN TỘC GẮN LIỀN VỚI CHỦ NGHĨA XÃ HỘI	L0.3 L0.5	**Dạy:** 1. TƯ TƯỞNG HỒ CHÍ MINH VỀ ĐỘC LẬP DÂN TỘC 1.Vấn đề độc lập dân tộc 2.Về cách mạng giải phóng dân tộc **Dạy:** Chẩm thuyết trình & phản biện **Học ở lớp:** Các nhóm thuyết trình tại lớp II.TƯ TƯỞNG HỒ CHÍ MINH VỀ CHỦ NGHĨA XÃ HỘI VÀ XÂY DỰNG CHỦ NGHĨA XÃ HỘI Ở VIỆT NAM 1.Tư tưởng Hồ Chí Minh về chủ nghĩa xã hội 2.Tư tưởng Hồ Chí Minh về xây dựng chủ nghĩa xã hội ở Việt Nam 3.Tư tưởng Hồ Chí Minh về thời kỳ quá độ lên chủ nghĩa xã hội ở Việt Nam III.TƯ TƯỞNG HỒ CHÍ MINH VỀ MỐI QUAN HỆ GIỮA ĐỘC LẬP DÂN TỘC VÀ CHỦ NGHĨA XÃ HỘI 1.Độc lập dân tộc là cơ sở, tiền đề để tiến lên chủ nghĩa xã hội 2.Chủ nghĩa xã hội là điều kiện để đảm bảo nền độc lập dân tộc vững chắc IV.VẬN DỤNG TƯ TƯỞNG HỒ CHÍ MINH VỀ ĐỘC LẬP DÂN TỘC GẮN LIỀN VỚI CHỦ NGHĨA XÃ HỘI TRONG SỰ NGHIỆP CÁCH MẠNG VIỆT NAM GIAI ĐOẠN HIỆN NAY 1.Kiên định mục tiêu và con đường cách mạng mà Hồ Chí Minh đã xác định 2.Phát huy sức mạnh dân chủ xã hội chủ nghĩa 3.Củng cố, kiện toàn, phát huy sức mạnh và hiệu quả hoạt động của toàn hệ thống chính trị 4.Đấu tranh chống những biểu hiện suy thoái về tư tưởng chính trị, đạo đức, lối sống và,”tự diễn biến”, “tự chuyển hóa” trong nội bộ **Học ngoài lớp:** Đọc trước tài liệu chương 4	Thuyết trình nhóm (GHW) Thi cuối kỳ (FEX)

5	**Chương 4** TƯ TƯỞNG HỒ CHÍ MINH VỀ ĐẢNG CỘNG SẢN VỆT NAM VÀ NHÀ NƯỚC CỦA NHÂN DÂN, DO NHÂN DÂN VÀ VÌ NHÂN DÂN	LO.4 LO.5	**Dạy:** I. TƯ TƯỞNG HỒ CHÍ MINH VỀ ĐẢNG CỘNG SẢN VIỆT NAM 1.Tính tất yếu và vai trò lãnh đạo của Đảng Cộng sản Việt Nam 2.Đảng phải trong sạch, vững mạnh **Dạy:** Chấm thuyết trình & phản biện **Học ở lớp:** Thảo luận tại lớp II.TƯ TƯỞNG HỒ CHÍ MINH VỀ NHÀ NƯỚC CỦA NHÂN DÂN, DO NHÂN DÂN, VÌ NHÂN DÂN 1.Nhà nước dân chủ 2.Nhà nước pháp quyền 3.Nhà nước trong sạch, vững mạnh III.VẬN DỤNG TƯ TƯỞNG HỒ CHÍ MINH VÀO CÔNG TÁC XÂY DỰNG ĐẢNG VÀ XÂY DỰNG NHÀ NƯỚC 1.Xây dựng Đàng thật sự trong sạch, vững mạnh 2.Xây dựng Nhà nước **Học ngoài lớp:** Hoàn thiện bài thuyết trình	Thảo luận nhóm (DIC) Thi cuối kỳ (FEX)
6	**Chương 5** TƯ TƯỞNG HỒ CHÍ MINH VỀ ĐẠI ĐOÀN KẾT DÂN TỘC VÀ ĐOÀN KẾT QUỐC TẾ		**Dạy:** 1. TƯ TƯỞNG HỒ CHÍ MINH VỀ ĐẠI ĐOÀN KẾT DÂN TỘC 1.Vai trò của đại đoàn kết dân tộc 2.Lực lượng của khối đại đoàn kết dân tộc 3.Điều kiện để xây dựng khối đại đoàn kết toàn dân tộc 4.Hình thức, nguyên tắc tổ chức của khối đại đoàn kết dân tộc - Mặt trận dân tộc thống nhất 5. Phương thức xây dựng khối đại đoàn kết dân tộc **Dạy:** Chấm thuyết trình & phản biện **Học ở lớp:** Thảo luận tại lớp II.TƯ TƯỞNG HỒ CHÍ MINH VỀ ĐOÀN KẾT QUỐC TẾ 1.Sự cần thiết phải đoàn kết quốc tế 2.Lực lượng đoàn kết quốc tế và hình thức tổ chức 3.Nguyên tắc đoàn kết quốc tế III.VẬN DỤNG TƯ TƯỞNG HỒ CHÍ MINH VỀ ĐẠI ĐOÀN KẾT DÂN TỘC VÀ ĐOÀN KẾT QUỐC TẾ TRONG GIAI ĐOẠN HIỆN NAY 1.Quán triệt tư tưởng Hồ Chí Minh về đại đoàn kết dân tộc và đoàn kết quốc tế trong hoạch định chủ trương, đường lối của Đảng	

			2.xây dựng khối đại đoàn kết toàn dân tộc trên nền tảng liên minh công - nông - trí thức dưới sự lãnh đạo của Đảng 3.Đại đoàn kết dân tộc phải kết hợp với đoàn kết quốc tế	
7	**Chương 6** TƯ TƯỞNG HỒ CHÍ MINH VỀ VĂN HÓA, ĐẠO ĐỨC, CON NGƯỜI		**Dạy:** I. TƯ TƯỞNG HỒ CHÍ MINH VỀ VĂN HÓA 1.Một số nhận thức chung về văn hóa và quan niệm giữa văn hóa với các lĩnh vực khác 2.Quan điểm của Hồ Chí Minh về vai trò của văn hóa 3.Quan điểm của Hồ Chí Minh về xây dựng nền văn hóa mới **Dạy:** Chấm thuyết trình & phản biện **Học ở lớp:** Thảo luận tại lớp II. TƯ TƯỞNG HỒ CHÍ MINH VỀ ĐẠO ĐỨC 1. Quan điểm về vai trò và sức mạnh của đạo dức cách mạng 2.Quan điểm về những chuẩn mực đạo đức cách mạng 3.Quan điểm về những nguyên tắc xây dựng đạo đức cách mạng III.TƯ TƯỞNG HỒ CHÍ MINH VỀ CON NGƯỜI 1.Quan niệm Hồ Chí Minh về con người 2.Quan niệm của Hồ Chí Minh về vai trò của con người 3.Quan niệm Hồ Chí Minh về xây dựng con người IV.XÂY DỰNG VĂN HÓA, ĐẠO ĐỨC, CON NGƯỜI VIỆT NAM HIỆN NAY THEO TƯ TƯỞNG HỒ CHÍ MINH 1.Xây dựng và phát triển văn hóa, con người 2.Về xây dựng đạo đức cách mạng	

7. Đánh giá môn học

ST T	Mã	Tên	Mô tả	Tỷ Trọng	Hình thức	LO

1	GHW	Thuyết trình nhóm	Thuyết trình nhóm về đề tài đã phân công	150%	Thuyết trình và bản báo cáo nhóm	LO.2, LO.3, LO.4, LO.5, LO.6.
2	Quiz	Bài thi giữa kỳ	Giảng viên cho thi	20%	Trắc nghiệm (đề đóng) hoặc tự luận (đề mở)	LO.2, LO.3.
3	DIC	Thảo luận tại lớp (Discussion in Class)	Điểm thảo luận được tính theo phương pháp tương đối. SV có số lần thảo luận tại lớp nhiều nhất sẽ được điểm tối đa, điểm của các bạn khác được tính dựa theo bạn có số lần thảo luận cao nhất.	15%	Phát biểu/đặt câu hỏi trên lớp hoặc phiêu trả lời trong các nghiên cứu tình huống tại lớp	LO.3, LO.4, LO.5, LO.6.
4	FEX	Thi cuối kỳ	Thi đề chung Đề thi bao quát toàn bộ nội dung môn học	50%	Tự luận (đề mở)	LO.2, LO.3, LO.4, LO.5, LO.6.
			Tổng cộng	**100%**		

8. Tiêu chí đánh giá chuẩn đầu ra môn học

TT	Chuẩn đầu ra	Nội dung	Phương pháp	Tiêu chí đánh giá
LO.1	- Hiểu được khái niệm tư tưởng Hồ Chí Minh. - Nắm được đối tượng; phương pháp nghiên cứu tư tưởng Hồ Chí Minh và ý nghĩa học tập môn tư tưởng Hồ Chí Minh.	Chương 1	Hỏi - Đáp	Cộng điểm
LO.2	- Hiểu rõ cơ sở, quá trình hình thành và phát triển tư tưởng Hồ Chí Minh. - Nắm dược giá trị tư tưởng Hồ Chí Minh đối với cách mạng Việt Nam và thế giới.	Chương 2	Thi giữa kỳ (Quiz)	Đề thi của GV
LO.3	- Nắm rõ nội dung tư tưởng Hồ Chí Minh về độc lập dân tộc và chủ nghĩa xã hội; mối quan hệ giữa độc lập dân tộc và chủ nghĩa xã hội. - Hiểu được sự vận dụng tư tưởng Hồ về độc lập dân tộc và chủ nghĩa xã hội của Đảng Cộng sản Việt Nam và Nhà nước ta.	Chương 3	Thuyết trình nhóm (GHW) Thi giữa kỳ (Quiz) Thi cuối kỳ (FEX)	Tiêu chí đánh giá thuyết trình nhóm Đề thi của GV Ngân hàng đề thi của khoa Chính trị - Hành chính
LO.4	- Nắm rõ nội dung tư tưởng Hồ Chí Minh về Đảng Cộng sản Việt nam và Nhà nước của dân, do dân, vì dân. - Hiểu được sự vận dụng của Đảng và Nhà nước ta vào công tác xây dựng Đảng và xây dựng Nhà nước.	Chương 4	Thuyết trình nhóm (GHW) Thi cuối kỳ (FEX)	Tiêu chí đánh giá thuyết trình nhóm Ngân hàng đề thi của khoa Chính trị - Hành chính
LO.5	- Nắm được nội dung tư tưởng Hồ Chí Minh về đại đoàn kết toàn dân tộc và đoàn kết quốc tế. - Hiểu được sự vận dụng của Đảng và Nhà nước ta trong việc hoạch định chủ trương, đường lối, chính sách về đại đoàn kết dân tộc và đối	Chương 5	Thuyết trình nhóm (GHW) Thi cuối kỳ (FEX	Tiêu chí đánh giá thuyết trình nhóm Ngân hàng đề thi của khoa Chính trị - Hành chính

LO.6	-Nắm được nội dung tư tưởng Hồ Chí Minh về văn hóa, đạo đức, con người. -Vận dụng tư tưởng Hồ Chí Minh về văn hóa, đạo đức và con người trong việc rèn luyện, tu dưỡng bản thân.	Chương 6	Thuyết trình nhóm (GHW) Thi cuối kỳ (FEX	Tiêu chí đánh giá thuyết trình nhóm Ngân hàng đề thi của khoa Chính trị - Hành chính

9. Một số lưu ý khác:

- Khi có các thắc mắc liên quan môn học, sinh viên có thể liên lạc với quản lý Bộ môn Hồ Chí Minh học & Lịch sử Đảng và Khoa Chính trị - Hành chính qua email: daotao.spas@vnuhcm.edu.vn

- Quy định về Bài thuyết trình nhóm GHW: Thành lập nhóm: 5 sinh viên/nhóm.

+ Hạn chót đăng ký đề tài nhóm Quản lý trên forum là Buổi 2.

+ Tuần 4 thuyết trình theo thứ tự. Lưu ý các nhóm cần có mặt đủ và mang theo tất cả các tài liệu liên quan đến GHW khi đi thuyết trình.

+ Hình thức nộp bài: Nộp file và biên bản làm việc nhóm qua mail cho GV

- Quy định về đánh giá môn học: theo Quy định về việc giảng dạy và học tập các môn Lý luận chính trị của khoa Chính trị - Hành chính.

Course Name: Special Study of the Field

Course Code: IT083IU

1. **General information**

Course designation	This course helps students to do a research topic and prepare for a thesis
Semester(s) in which the course is taught	7
Person responsible for the course	Lecturers (thesis advisor)
Language	English
Relation to curriculum	Compulsory
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	(Total workload: 90 hours Contact hours (please specify whether lecture, exercise, laboratory session, etc.): Private study including examination preparation, specified in hours: 90
Credit points	Number of credits : 3 Lecture: 0 Laboratory: 3
Required and recommended prerequisites for joining the course	Required number of credits, Internship
Course objectives	Students are advised to select a subject under the guidance of a faculty member. Project content might be a research topic or building a new application that underlies the graduation thesis. Research topics include fields of academic program that are academic or practical.
Course learning outcomes	CLO 1. Research a specific topic in the field. CLO 2. Design the model or system architecture of the application product CLO 3. Have a good preparation to develop and improve the product in the thesis.

Competency level	Course learning outcome (CLO)
Knowledge	CLO1
Skill	CLO1, CLO2
Attitude	CLO3

<table>
<tr><td>Content</td><td>The description of the contents should clearly indicate the weighting of the content and the level.
Weight: in the whole semester.
Teaching levels: I (Introduce); T (Teach); U (Utilize)
<table>
<tr><th>Topic</th><th>Weight</th><th>Level</th></tr>
<tr><td>Find out/define a topic of the subject</td><td>3</td><td>U</td></tr>
<tr><td>Review and evaluate existing issues/problems</td><td>8</td><td>U</td></tr>
<tr><td>Research and propose some solutions</td><td>8</td><td>U</td></tr>
<tr><td>Deploy some main functions or new features for the product project</td><td>8</td><td>U</td></tr>
<tr><td>Testing and evaluating solutions or products</td><td>8</td><td>U</td></tr>
<tr><td>Write a report</td><td>10</td><td>U</td></tr>
</table></td></tr>
<tr><td>Examination forms</td><td>Multiple-choice questions, short-answer questions</td></tr>
<tr><td>Study and examination requirements</td><td>Attendance: A minimum attendance of 80 percent is compulsory for the appointments with lecturer. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.
Assignments/Tasks: Students must have more than 50/100 points overall to pass this course.</td></tr>
<tr><td>Reading list</td><td>Related works and books</td></tr>
</table>

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-3) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO					
CLO	1	2	3	4	5	6
1		X				
2		X				X
3			X			

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
1	Find out the topic of the subject	1,2	Check and Evaluate	Discuss and Research	Related work, books and research papers
2	Review and evaluate existing issues	1,2	Check and Evaluate	Discuss and Research	Related work, books and research papers

4	Research and propose some solutions	1,2	Check and Evaluate	Discuss and Research	Related work, books and research papers
5	Deploy some main functions or new features for the product project	1,2	Check and Evaluate	Discuss and Research	Related work, books and research papers
6	Testing and evaluating solutions or products	1,2	Check and Evaluate	Discuss and Research	Related work, books and research papers
7	Write a report	1,2	Check and Evaluate	Discuss and Research	Related work, books and research papers
8	**Final grade**				

4. **Assessment plan**

Assessment Type	**CLO1**	**CLO2**	**CLO3**
Final grade (100%)	30%	40%	30%

Note: %Pass: Target that % of students having scores greater than 60 out of 100.

5. **Rubrics (optional)**

5.1. Grading checklist

Grading checklist for Written Reports			
Student: …….. Date: ……	HW/Assignment: ……. Evaluator: ……		
	Max.	**Score**	**Comments**
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		

Clear and easy to read	10		
Quality of Layout and Graphics (10%)	10		
TOTAL SCORE	100		

5.2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	**Description**
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	Issue/ problem to be considered critically is stated without clarification or description.

Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation / evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective,	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.

	thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	(perspective, thesis/ hypothesis).		
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequence s and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequence s and implications) are oversimplifie d.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.

	presentation cohesive.			
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities)	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference

	make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022

Dean of School of Computer Science and Engineering

Assoc.Prof. Nguyen Van Sinh

Course Name: Internet of Things

Course Code: IT134IU

1. General information

Course designation	The course explains the architecture, components of Internet of Thing networks.
Semester(s) in which the course is taught	
Person responsible for the course	Dr. Le Duy Tan
Language	English
Relation to curriculum	Elective (All programs)
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: 195 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 45 (lecture) + 30 (laboratory) Private study including examination preparation, specified in hours: 120
Credit points	Number of credits: 4 Lecture: 2 Laboratory: 1 Mini project: 1
Required and recommended prerequisites for joining the course	Computer Networks
Course objectives	The students will study the communication techniques between the components from short range to long range such as Bluetooth, Zigbee, Wi-fi, Lora, NB-IoT,… Moreover, the data storage, organization and analytics are also studied in this course. Furthermore, the mini project within this course will elevate students' understanding of the current state of the IoT industry world.
Course learning outcomes	CLO 1. The ability of designing and implementing some Internet of Thing systems; CLO 2. The ability of collecting data then applying some data mining techniques to analyze the data in some IoT applications.

Competency level	**Course learning outcome (CLO)**
Knowledge	CLO 1
Skill	CLO 1 and CLO 2
Attitude	CLO 1

Content

The description of the contents should clearly indicate the weighting of the content and the level.
Weight: lecture session (3 hours)
Teaching levels: I (Introduce); T (Teach); U (Utilize)

Topic	**Weight**	**Level**
Week 1: Introduction to Internet of Things	1	I
Week 2 : IoT System Design	1	U

		Week 3: Sensors and actuators in IoTs	1	T
		Week 4-8: Communication technologies in IoTs: PAN (Bluetooth, Zigbee), LAN (IEEE 802.11), WAN (LoRa, LTE)	5	T
		Week 9: Data collection in IoT	1	T, U
		Week 10: Data analytics	1	U
		Week 11-14: IoT Applications in Industry	4	T, U
		Week 15: Mini Project Presentation	1	U
Examination forms	Multiple-choice questions, short-answer questions			
Study and examination requirements	Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. Assignments/Examination: Students must have more than 50/100 points overall to pass this course.			
Reading list	[1] Raj Kamal, Internet of Things Architecture and Design Principles, Mc Graw Hill India, 2017 [2] Hanes, David, et al. IoT fundamentals: Networking technologies, protocols, and use cases for the internet of things. Cisco Press, 2017. [3] Singh, Rajesh, et al. Internet of things with Raspberry Pi and Arduino. CRC Press, 2019. [4] Dow, Colin. Internet of things programming projects: build modern IoT solutions with the Raspberry Pi 3 and Python. Packt Publishing Ltd, 2018.			

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO					
CLO	1	2	3	4	5	6
1		✓✓✓			✓✓	
2						✓

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
1	Introduction to Internet of Things	1, 2	Homework	Lecture, Discussion, Inclass-Quiz	[1]

2	IoT System Design	1	Homework	Lecture, Group work	[2]
3	Sensors and actuators in IoTs	1	Homework	Lecture, Discussion, Inclass-Quiz	[1]
	Midterm		**Written exam**		
4 - 8	Communication technologies in IoTs: PAN (Bluetooth, Zigbee), LAN (IEEE 802.11), WAN (LoRa, LTE)	1	Homework	Lecture, Discussion, Inclass-Quiz	[1] [2]
9	Data collection in IoT	2	Homework	Lecture, Discussion, Inclass-Quiz	[1]
10	Data analytics	1, 2	Homework	Lecture, Group work	[2]
12 - 14	IoT Applications in Industry	2	Homework	Lecture, Discussion, Inclass-Quiz, Presentation	[1]
15	Week 15: Mini Project Presentation	1, 2	Presentation	Test	
	Final exam		**Written exam**		

Assessment plan

Assessment Type	**CLO1**	**CLO2**
Quiz (5%)		10%
Labs (20%)	20%	20%
Midterm examination (30%)	30%	20%
Mini Project (5%)	25%	
Final examination (40%)	25%	50%

5. Rubrics (optional)

5.1.Grading checklist

Grading checklist for Written Reports			
Student: …….. HW/Assignment: ……. Date: …… Evaluator: ……			
	Max.	**Score**	**Comments**
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		

Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)	10		
TOTAL SCORE	100		

5.2.Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	**Description**
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.3.Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	Issue/ problem to be considered critically is stated without clarification or description.
Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation/ evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.

Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022

Dean of School of Computer Science and Engineering

Assoc.Prof. Nguyen Van Sinh

Course Name: System and Network Administration
Course Code: IT125IU

1. General information

Course designation	Introduce new networking technologies, covering network topologies, deployment concepts, protocols, and system and management techniques
Semester(s) in which the course is taught	5
Person responsible for the course	MSc. Le Thanh Son
Language	English
Relation to curriculum	Compulsory (NE)
Teaching methods	Lecture
Workload (incl. contact hours, self-study hours)	Total workload: 195 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 45 (lecture) + 30 (laboratory) Private study including examination preparation, specified in hours: 120
Credit points	Number of credits: 4 Lecture: 2 Laboratory: 1 Mini project: 1
Required and recommended prerequisites for joining the course	Computer Networks
Course objectives	Introduce new networking technologies, covering network topologies, example deployment concepts, protocols, and management techniques. Explains the different elements and technologies that are used in enterprise network and how they relate to each other. Focus on fundamental concepts and principles. Provides a solid technical foundation to successfully navigate network management topics and apply those concepts to particular situations. Working in an industrial environment can help students deepen their understanding of administration jobs and sharpen their skills.
Course learning outcomes	CLO 1. Understand key elements and services of networked systems in enterprise environments CLO 2. Understand the technologies used in enterprise networks and how they related to each other CLO 3. Understand the role and responsibility of system administrator

Competency level	**Course learning outcome (CLO)**
Knowledge	1, 2, 3
Skill	2
Attitude	3

Content

The description of the contents should clearly indicate the weighting of the content and the level.
Weight: lecture session (~~3~~ hours)
Teaching levels: I (Introduce); T (Teach); U (Utilize)

Topic	**Weight**	**Level**

	Introduction to system and network administration	3	I
	System element: Workstations	3	T, U
	System element: Servers	3	T, U
	Server strategies	3	T, U
	Enterprise Services	3	T, U
	Data center	3	
	Networks	3	T, U
	Disaster Recovery and Data Integrity	3	T, U
	Security Policy	3	T, U
	System Administrators	3	T, U
	System and Network in the Industry	3	T, U
	Working in Industry Report and Presentation	3	T, U
Examination forms	Multiple-choice questions, short-answer questions		
Study and examination requirements	Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. Assignments/Examination: Students must have more than 50/100 points overall to pass this course.		
Reading list	1. Thomas Limoncelli, Practice of System and Network Administration, Volume 1, 2016 2. Alexander Clemm, Network Management Fundamentals 1st, 2006		

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-3) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

CLO\SLO	1	2	3	4	5	6
1	xxx					
2	xxx					
3			x	xxx		

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
1	Introduction to system and network administration	3	Quiz	Lecture	1, 2
2	System element: Workstations	1, 2	Quiz, Midterm	Lecture	1
3	System element: Servers	1, 2	Quiz, Lab, Midterm	Lecture, Discussion	1
4	Server strategies	1, 2	Quiz, Lab, Midterm	Lecture, Discussion	1
5	Enterprise Services	1, 2	Quiz, Lab, Midterm	Lecture, Discussion	1

6	Data center	1, 2	Quiz, Lab, Midterm	Lecture, Discussion	1
7	Networks	1, 2	Quiz, Lab, Midterm	Lecture, Discussion	1
8	Disaster Recovery and Data Integrity	1, 2	Quiz, Lab, Midterm	Lecture, Discussion	1
MIdterm exam					
9	Security Policy	1, 2	Quiz, Final	Lecture, Discussion	1
10	System Administrators	1, 2	Quiz, Final	Lecture, Discussion	1
11-14	System and Network in the Industry	1, 2	Quiz, Final	Lecture, Discussion	1
15	Working in Industry Report and Presentation	1, 2	Quiz, Final	Test	1
Final exam					

4. Assessment plan

Assessment Type	**CLO1**	**CLO2**	**CLO3**
Presentation (20%)	20%	20%	20%
Lab (10%)	10%	10%	
Midterm examination (30%)	30%	30%	30%
Final examination (40%)	40%	40%	50%

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

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1. When calculating contact time, each contact hour is counted as a full hour because the organization of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.↩

Rubrics (optional)

5.1. Grading checklist

Grading checklist for Written Reports			
Student: ……..	HW/Assignment: …….		
Date: ……	Evaluator: ……		
	Max.	**Score**	**Comments**
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		

Clear and easy to read	10		
Quality of Layout and Graphics (10%)	10		
TOTAL SCORE	100		

5.2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	**Description**
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	Issue/ problem to be considered critically is stated without clarification or description.
Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation/ evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.

Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022

Dean of School of Computer Science and Engineering

Assoc.Prof. Nguyen Van Sinh

Course Name: Entrepreneurship

Course Code: IT120

1. **General information**

Course designation	An introduction to the creative and innovative managerial practices of successful entrepreneurship.
Semester(s) in which the course is taught	7
Person responsible for the course	MSc. Dao Tran Hoang Chau
Language	English
Relation to curriculum	Compulsory (CS, NE, CE) Elective (DS)
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	Total workload: 135 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 45 (lecture) Private study including examination preparation, specified in hours: 90
Credit points	Number of credits : 3 Lecture: 3 Laboratory: 0
Required and recommended prerequisites for joining the course	
Course objectives	This course reviews the significant economic and social contributions entrepreneurs provide to society, the intense lifestyle commitment, and the skills necessary for entrepreneurial success. It explores how to identify and develop solutions to the most common leadership and personal challenges faced by entrepreneurs when starting new ventures or launching new products. It also promotes a deeper understanding of what is required to be a successful entrepreneur, highlights the skills and tools necessary to start a new business and explores alternatives to common pitfalls.This course applies entrepreneurial marketing approaches used by successful entrepreneurs. These include utilizing industry sector trends, identifying emerging customer niches, developing new products/services, using guerilla marketing strategies, and Internet and social marketing strategies. It emphasizes the importance of managing cash flows, ratio analysis, pro forma development, and the basics of deal structure and harvesting a business venture. Students will identify and

<table>
<tr><td></td><td>interpret sources of information from company financial reports, financial publications, industry benchmarks, the media, and web sites.An introduction to the process of researching, writing, and presenting a business plan. Students identify and screen ideas using a business feasibility study that describes the product features, market opportunity, customer profile, sales forecast, competitive advantage, and profit potential. Following a successful feasibility study, students may use business plan software as each develops their own complete business plan.</td></tr>
<tr><td>Course learning outcomes</td><td>CLO 1. Understand entrepreneurial processes;
CLO 2. Apply new technology to boost business performance;
CLO 3. Manage marketing strategy and financial statements in a enterprise;
<table>
<tr><th>Competency level</th><th>Course learning outcome (CLO)</th></tr>
<tr><td>Knowledge</td><td>1, 2, 3</td></tr>
<tr><td>Skill</td><td>1, 3</td></tr>
<tr><td>Attitude</td><td>3</td></tr>
</table></td></tr>
<tr><td>Content</td><td>The description of the contents should clearly indicate the weighting of the content and the level.
Weight: lecture session (3 hours)
Teaching levels: I (Introduce); T (Teach); U (Utilize)
<table>
<tr><th>Topic</th><th>Weight</th><th>Level</th></tr>
<tr><td>Entrepreneurship, Creativity and Innovation;</td><td>3</td><td>I, T</td></tr>
<tr><td>Creative Problem Solving Model;</td><td>3</td><td>T, U</td></tr>
<tr><td>Develop a Product. Generate Ideas and Protect Inventions;</td><td>2</td><td>T</td></tr>
<tr><td>Marketing Strategies;</td><td>3</td><td>T, U</td></tr>
<tr><td>Finance and Accounting</td><td>4</td><td>T, U</td></tr>
</table></td></tr>
<tr><td>Examination forms</td><td>Multiple-choice questions, short-answer questions</td></tr>
<tr><td>Study and examination requirements</td><td>Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.
Assignments/Examination: Students must have more than 50/100 points overall to pass this course.</td></tr>
<tr><td>Reading list</td><td>1. Duening & Hisrich & Lechter, Technology Entrepreneurship 2nd, 2014</td></tr>
</table>

2. **Learning Outcomes Matrix**

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO					
CLO	1	2	3	4	5	6
1			x			
2		x				
3				x		

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
1	Entrepreneurship, Creativity and Innovation;	1	Midterm exam	Lecture, In-class activities, Quiz	
2	Creative Problem Solving Model;	1	Midterm exam	Lecture, In-class activities, Quiz	
3	Develop a Product. Generate Ideas and Protect Inventions;	2	Midterm exam, Assignment	Lecture, In-class activities, Project	
4	Midterm				
5	Marketing Strategies;	3	Final exam, Assignment	Lecture, Project	
6	Finance and Accounting	3	Final exam, Assignment	Lecture, Project	
7	**Final exam**				

4. Assessment plan

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

Assessment Type	CLO1	CLO2	CLO3
Midterm examination (25%)	50%	50%	
Projects/Presentations/ Report (25%)			60%
Final examination (40%)			40%
Exercises/ Quiz (10%)	50%	50%	

Rubrics (optional)

1. Grading checklist

Grading checklist for Written Reports

Student: …….. Date: ……	HW/Assignment: ……. Evaluator: ……		
	Max.	**Score**	**Comments**
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)	10		
TOTAL SCORE	100		

2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	**Description**
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

3. **Analytic rubric**

Critical thinking value rubric for evaluating questions in exams:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**

Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	Issue/ problem to be considered critically is stated without clarification or description.
Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation / evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts

	presenting a position.		others' assumptions than one's own (or vice versa).	when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	Milestone		Benchmark
	4	3	2	1
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.

	polished and confident.			
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022

Dean of School of Computer Science and Engineering

Assoc.Prof. Nguyen Van Sinh

Course Name: Engineering Ethics and Professional Skills

Course Code: PE020

1.General information

Course designation	
Semester(s) in which the course is taught	5,7
Person responsible for the course	Huynh Kim Lam, Dr.
Language	English
Relation to curriculum	Compulsory / elective / specialisation Names of other study programmes with which the module is shared
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: Contact hours (please specify whether lecture, exercise, laboratory session, etc.): Private study including examination preparation, specified in hours: Student responsibility: Students are expected to spend at least 8 hours per week for self – studying. This time should be made up of reading, working on exercises and problems and group assignment.
Credit points	Number of credits : 3 Lecture: 3 Laboratory: 0
Required and recommended prerequisites for joining the course	
Course objectives	This course is designed to introduce engineering students to the concepts, theory and practice of engineering ethics. It will allow students to explore the relationship between ethics and engineering and apply classical moral theory and decision making to engineering issues encountered in academic and professional careers. Our society places a great deal of responsibility on its professionals and requires that they conduct themselves in a manner fitting to the place of prominence accorded to them by the community. Studying and understanding professional ethics is as much a part of your development as an engineer as is the study of higher order mathematics You must be able to broaden your mind and be open to society's ever changing

	fact that you may not always agree; therefore, we will be working in teams on majority of the character. It is important that you learn to share ideas and concepts regardless of the assignments in this course.
Course learning outcomes	CLO 1. Understanding of intellectual property, copyright, and fair use of copyrighted materials and research data, and follows behaviour consistent with academic integrity and social responsibility. CLO 2. Be able to integrate professional ethics and equity to issues encountered during engineering practice. CLO 3. Be able to analyze social, environment, legal aspects, safety and sustainability issues of engineering activities. **Competency level** / **Course learning outcome (CLO)** Knowledge Skill Attitude
Content	*The description of the contents should clearly indicate the weighting of the content and the level.* Weight: lecture session (~~3~~ hours) Teaching levels: I (Introduce); T (Teach); U (Utilize)

Topic	**Weight**	**Level**
Introduction to engineering professionalism and ethics		
Role of Professional Societies		
Academic & Research Ethics		
Engineers in Society		
Philosophical ethics: Descriptive and presceiptive claims, Relativism theory		
Philosophical ethics: Utilitarian theory, Kantian theory		
The important if intention truth in action and words		
Midterm exam		
Leadership in engineering and society		

	Engineer at the Workplace and Organizations		
	Commitment to Safety		
	Internet ethics		
	Privacy Issues and Intellectual Property Rights		
	Environmental ethics Sustainable engineering		
	Globalization and intern Cultural considerations		
	Final exam		
Examination forms	Multiple-choice questions, short-answer questions		
Study and examination requirements	Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. Assignments/Examination: Students must have more than 50/100 points overall to pass this course.		
Reading list			

2. Learning Outcomes Matrix (optional)

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO					
CLO	1	2	3	4	5	6
1						
2						
3						
4						

3. Planned learning activities and teaching methods

Week	**Topic**	**CLO**	**Assessments**	**Learning activities**	**Resources**
1	Introduction to engineering professionalism and ethics				

2	Role of Professional Societies				
3	Academic & Research Ethics				
4	Engineers in Society				
5	Philosophical ethics: Descriptive and presceiptive claims, Relativism theory				
6	Philosophical ethics: Utilitarian theory, Kantian theory				
7	The important if intention truth in action and words				
8	**Midterm**				
9	Midterm exam				
10	Leadership in engineering and society				
11	Engineer at the Workplace and Organizations				
12	Commitment to Safety				
13	Internet ethics				
14	Privacy Issues and Intellectual Property Rights				
15	Environmental ethics Sustainable engineering				
16	Globalization and intern Cultural considerations				
17	Final exam				
18	**Final exam**				

4. Assessment plan

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022

Dean of School of Computer Science and Engineering

Assoc.Prof. Nguyen Van Sinh

Course Name: Thesis
Course Name: IT058IU

1. General information

Course designation	This course evaluates students obtained knowledges to complete the academic program.
Semester(s) in which the course is taught	8
Person responsible for the course	Lecturers (thesis advisor)
Language	English
Relation to curriculum	Compulsory
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	Contact hours: 300 hours Private study including examination preparation, specified in hours: 300
Credit points	Number of credits : 10 Lecture: 0 Laboratory: 10
Required and recommended prerequisites for joining the course	Required number of credits Special Study of the Field
Course objectives	Dissertations are industrial projects designed to ensure that students have mastered their subjects in the program. All projects are based on "real projects" provided by the industry to students to develop skills and apply knowledge gained from all courses throughout the program. Students will work independently to develop requirements, design, implement and provide solutions to business problems. Students can follow any appropriate process model, must self-manage the project, follow all appropriate project management techniques. The success of the project is largely determined by whether the student adequately solves the client's problem. Students will provide the final product with all artifacts that match the process model being used (e.g. project plan, technical requirements, system architecture, design documentation, test plan, source code and installed software products).
Course learning outcomes	CLO 1. Research a specific topic in the field. CLO 2. Design the model or system architecture of the application product

<table>
<tr><td></td><td>CLO 3. Hard work to develop and finish the product of the thesis.

<table><tr><th>Competency level</th><th>Course learning outcome (CLO)</th></tr><tr><td>Knowledge</td><td>CLO1</td></tr><tr><td>Skill</td><td>CLO1, CLO2</td></tr><tr><td>Attitude</td><td>CLO3</td></tr></table></td></tr>
<tr><td>Content</td><td>The description of the contents should clearly indicate the weighting of the content and the level.
Weight: in the whole last semester
Teaching levels: I (Introduce); T (Teach); U (Utilize)
<table><tr><th>Topic</th><th>Weight</th><th>Level</th></tr><tr><td>Find out the thesis topic</td><td>4</td><td>U</td></tr><tr><td>Review and evaluate existing issues</td><td>20</td><td>U</td></tr><tr><td>Research and propose some solutions</td><td>30</td><td>U</td></tr><tr><td>Deploy the thesis product</td><td>40</td><td>U</td></tr><tr><td>Testing and evaluating solutions or products</td><td>40</td><td>U</td></tr><tr><td>Thesis defense</td><td>1</td><td>U</td></tr></table></td></tr>
<tr><td>Examination forms</td><td>Multiple-choice questions, short-answer questions</td></tr>
<tr><td>Study and examination requirements</td><td>Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.
Assignments/Examination: Students must have more than 50/100 points overall to pass this course.</td></tr>
<tr><td>Reading list</td><td></td></tr>
</table>

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-3) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO					
CLO	1	2	3	4	5	6
1	X	X				
2	X	X				X
3			X			

3. **Planned learning activities and teaching methods**

Week	Topic	CLO	Assessments	Learning activities	Resources
1	Find out the thesis topic	1,2	Check and Evaluate	Discuss and Research	Related work, books and research papers
2	Review and evaluate existing issues	1,2	Check and Evaluate	Discuss and Research	Related work, books and research papers
4	Research and propose some solutions	1,2	Check and Evaluate	Discuss and Research	Related work, books and research papers
5	Deploy the thesis product	1,2	Check and Evaluate	Discuss and Research	Related work, books and research papers
6	Testing and evaluating solutions or products	1,2	Check and Evaluate	Discuss and Research	Related work, books and research papers
7	Thesis defense	1,2,3	By committee	presentation	
8	**Final grade**				

4. **Assessment plan**

Assessment Type	CLO1	CLO2	CLO3
Final grade (100%)	30%	40%	30%

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. **Rubrics (optional)**

5.1. Grading checklist

Grading checklist for Written Reports			
Student: …….. Date: ……	HW/Assignment: ……. Evaluator: ……		
	Max.	**Score**	**Comments**
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		

Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)	10		
TOTAL SCORE	100		

5.2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	**Description**
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/ or	Issue/ problem to be considered critically is stated without clarification or description.

			backgrounds unknown.	
Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation / evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into	Specific position (perspective, thesis/hypothesis) takes into account the complexities of	Specific position (perspective, thesis/ hypothesis) acknowledges different	Specific position (perspective, thesis/ hypothesis) is stated, but is

	account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	sides of an issue.	simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequence s and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequence s and implications) are oversimplifie d.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable

	consistently observable and is skillful and makes the content of the presentation cohesive.	consistently observable within the presentation.	observable within the presentation.	within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities)

	authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022

Dean of School of Computer Science and Engineering

Assoc.Prof. Nguyen Van Sinh

Course name: General Law

Course Code: PE021IU

1.General information

Department	Office of Academic Affairs
Course classification	Foundation course
Course designation	Face to face
Semester(s) in which the course is taught	All semesters in each academic year
Person responsible for the course	Dr. Vo Tuong Huan LLM. Bui Doan Danh Thao
Language	English
Relation to curriculum	Compulsory
Teaching methods	Student-centred approach
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: 127.5 hours) Contact hours (lecture, in class discussions): 37.5 hours (=45 periods) Private study including examination preparation, specified in hours[7]: 90 hours
Credit points	3
Required and recommended prerequisites for joining the course	N/A

[7] When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.

Course objectives	The overarching aims of this course are to: 4. Provide essential knowledge of Vietnamese legal system through integrated technology and real cases for social and cultural sustainability. • Raise awareness of responsibility toward others and how to stand for ending all types of legal violations, **especially corruption in various social contexts**. • Practice necessary skills to act as an ambassador to ensure social fairness and global equitable rights. • Use integrated online legal resources and communication tools to help the community to identify issues and develop countermeasures.

<table>
<tr><td>Course learning outcomes</td><td>Upon the successful completion of this course, students will be able to:
<table>
<tr><th>Competency level</th><th>Course learning outcome (CLO)</th></tr>
<tr><td>Knowledge</td><td>CLO1. Apply appropriate legal knowledge in the Vietnamese legal system to solve legal issues in various social contexts for a fair sustainable lifelong being.
CLO1.1. Apply general knowledge on state and law to solve legal issues in various social contexts for a fair sustainable lifelong being.
CLO1.2. Apply principle legal norms in some law branches such as constitution, civil, criminal, labor and administrative law to solve legal issues in various social contexts for a fair sustainable lifelong being.</td></tr>
<tr><td>Skill</td><td>CLO2. Communicate knowledge in the Vietnamese legal system to encourage people to raise their legal rights aiming for fair social/cultural moves.
CLO3. Integrate ICTs to solve legal issues in various social contexts.</td></tr>
<tr><td>Attitude</td><td>CLO4. Detect the responsibility to ensure social and cultural fairness, including ending corruption, in various social contexts through understanding importance of law in social contexts.
CLO5. Respond to the base for coexistence in various social contexts.</td></tr>
</table></td></tr>
<tr><td>Content</td><td>The course will introduce students to Vietnamese legal systems. In particular, students will understand their rights and obligations in the Constitution, Criminal law, administrative law, civil law, labor law and enterprise law of Vietnam. From this, students will raise awareness towards their responsibility to ensure justice, including ending corruption, in society.</td></tr>
<tr><td>Examination forms</td><td>Multiple choice questions
Case-based exams
Essay exams
Oral exams</td></tr>
</table>

Study and examination requirements

To pass this course, the students must:

- Achieve a composite mark of at least 50; and
- Make a satisfactory attempt at all assessment tasks (see below).

GRADING POLICY

Grades can be based on the following:

Assignment	20%
Midterm examination	30%
Final examination	50%
Total	100%

COURSE POLICIES

Attendance

Regular and punctual attendance at lectures and seminars is expected in this course. University regulations indicate that if students attend less than eighty percent of scheduled classes they may be refused final assessment. Exemptions may only be made on eligible medical grounds.

Workload

It is expected that the students will spend at least *six* hours per week studying this course. This time should be made up of reading, research, working on exercises and problems, and attending classes. In periods where they need to complete assignments or prepare for examinations, the workload may be greater.

Over-commitment has been a cause of failure for many students. They should take the required workload into account when planning how to balance study with part-time jobs and other activities.

General Conduct and Behaviour

The students are expected to conduct themselves with consideration and respect for the needs of fellow students and teaching staff. Conduct which unduly disrupts or interferes with a class, such as ringing or talking on mobile phones, is not acceptable and students will be asked to leave the class. The use of laptops is also encouraged during law lessons only to search for materials online. More information on student conduct is available on the university webpage.

Keeping informed

	The students should take note of all announcements made in lectures or on the course's Blackboard, and another announced mean of communications. From time to time, the university will send important announcements to their university e-mail addresses without providing a paper copy. The students will be deemed to have received this information. **Academic honesty and plagiarism** Plagiarism is the presentation of the thoughts or work of another as one's own. Students are also reminded that careful time management is an important part of the study and one of the identified causes of plagiarism is poor time management. Students should allow sufficient time for research, drafting, and the proper referencing of sources in preparing all assessment items. The university regards plagiarism as a form of academic misconduct and has very strict rules regarding plagiarism. **Special consideration** Requests for special consideration (for final examination only) must be made to the Office of Academic Affairs within one week after the examination. General policy and information on special consideration can be found at the Office of Academic Affairs. Absence on the Mid-term is not allowed, or in special cases approved by Lecturer can be replaced with relevant Assignment. **Meeting up with the lecturers after classes** Students must make an appointment via emails if they want to meet up with the lecturer after classes and be on time. If there are any changes to the scheduled time, students must inform the lecturer immediately.
Reading list	Please note that it is very important to gain familiarity with the subject matter in the readings and cases available on Blackboard and the internet *before* attendance in classes. **Required Course Texts and Materials** Legal Texts: 1. Constitution of Vietnam - 2013 2. Civil Code of Vietnam - 2015 3. Criminal Code of Vietnam – 2015 (amended in 2017) 4. Law on Law on Handling of Administrative Violations 2012 5. Law on Enterprises – 2020 6. Labour Code 2019 7. Law on anti-corruption 2018 Available at https://luatvietnam.vn/ or Blackboard

	Books: • PGS.TS. Phan Trung Hien, *Giáo trình Pháp Luật Đại cương*, NXB Chính Trị Quốc Gia Sự Thật 2022. • Mai Hong Quy (Chief Editor) (2nd 2017), *Introduction to Vietnamese Law,* Hong Duc Publishing House. Additional materials provided in Blackboard The lecturer will attempt to make lecture notes and additional reading available on Blackboard. However, this is not an automatic entitlement for students doing this subject. Note that this is not a distance learning course, and you are expected to attend lectures and take notes. This way, you will get the added benefit of class interaction and demonstration. **Optional Course Texts and Materials** Recommended Internet sites UNCTAD (United Nations Conference on Trade and Development) WTO (World Trade Organization) MOIT - Vietnam (Official website of Ministry of Industry and Trade) MPI - Vietnam (Official website of Ministry of Planning and Investment) Other Resources, Support and Information Additional learning assistance is available for students in this course and will be made available on Blackboard. Academic journal articles are available through connections via the VNU - Central Library. Recommended articles will be duly informed to the students. Books: • Nguyen Phu Trong, *Kiên quyết, kiên trì đấu tranh phòng, chống tham nhũng, tiêu cực, góp phần xây dựng đảng và nhà nước ta ngày càng trong sạch, vững mạnh*, NXB Chính Trị Quốc Gia Sự Thật 2023. • University of Law Ho Chi Minh City, *Giáo trình luật Hiến pháp Việt nam*, NXB Hồng Đức 2023. • University of Law Ho Chi Minh City, *Giáo trình Luật hành chính*, NXB Hồng Đức 2022. • University of Law Ho Chi Minh City, *Giáo trình Luật hình sự Việt Nam*, NXB Hồng Đức 2022.

	• University of Law Ho Chi Minh City, *Giáo trình Luật dân sự Việt Nam*, NXB Hồng Đức 2022. • University of Law Ho Chi Minh City, *Giáo trình Luật lao động Việt Nam*, NXB Hồng Đức 2022. • University of Law Ho Chi Minh City, *Giáo trình pháp luật về chủ thể kinh doanh*, NXB Hồng Đức 2022.

5. **Learning Outcomes Matrix (optional)**

The relationship between Course Learning Outcomes (SLO) (1-5) and Program/Student Learning Outcomes (PLO/SLO) (1 - 10) is shown in the following table:

	PLO/SLO									
SLO	**1**	2	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1	R,M					R,M	R,M	R,M	R,M	R,M
2			R,M							
3			R,M							
4				R,M						
5					R,M					

R: Reinforced
M: Mastery

6. **Planned learning activities and teaching methods**

Week	**Topic**	**CLO**	**Assessments**	**Learning activities**	**Resources**
1	**Introduction to State** • What is State? • Nature of state • Forms of state • Functions of state • Introduction to structure of Vietnamese state	1-5 (level I - introduced)	Tests Peer evaluations Class-performance evaluations	Discussions Case studies	PPT - Introduction to Vietnamese legal system available on Blackboard
2	**Introduction to law?** • What is law? • Nature of law • Forms of law • Structure of law • Categorization of legal system. • Enforcement • Breach of law and liabilities for breach of law	1-5 (level I - introduced)	Tests Peer evaluations Class-performance evaluations	Discussions Case studies	PPT - Introduction to Vietnamese legal system available on Blackboard

	• Introduction to structure of Vietnamese legal system				
3	**Constitutional Law** • General introduction on Vietnamese Constitution and its nature and basic principles. • Political, economic and other regimes of Vietnam • Basic rights and responsibilities of citizens. Relationship between citizens and the State. • Structure, functions and duties of Vietnamese state, especially in prevention of corruption	1-5 (Level R - reinforced)	Tests Peer evaluations Class-performance evaluations	Discussions Case studies	PPTs – Constitutional law available on Blackboard Constitution 2013 available on Blackboard
4	**Constitutional Law (Cont)** • Structure and functions and duties of Vietnamese state • Duties of the state in prevention of corruption	1-5 (Level R - reinforced)	Tests Peer evaluations Class-performance evaluations	Discussions Case studies	PPTs – Constitutional law available on Blackboard Constitution 2013 available on Blackboard
5	**Administrative Law** • Definition and nature of administrative law • Administrative law violations • Liabilities for breach of administrative law, exemption from the liability	1-5 (Level R - reinforced)	Tests Peer evaluations Class-performance evaluations	Discussions Case studies and law on anti-corruption	PPT– Administrative law available on Blackboard Law on handling administrative violations 2012, and Law on anti-corruption 2018 available on Blackboard

6	**Criminal Law** • Definition and nature of criminal law • Crimes • Punishments	1-5 (Level R - reinforced)	Tests Peer evaluations Class-performance evaluations	Discussions Case studies, especially cases related to corruption	PPT– Criminal law available on Blackboard Criminal code 2015 available on Blackboard
7	**Criminal Law (Cont)** • Crimes related to corruption • Punishments for corruption	1-5 (Level R - reinforced)	Tests Peer evaluations Class-performance evaluations	Discussions Case studies, especially cases related to corruption	PPT– Criminal law available on Blackboard Criminal code 2015 available on Blackboard
8	**Revision for mid-term exam**		Quizzes Projects		
9	**Civil Law (Part I)** • Definition and nature Civil law relationship • Subject of civil law • Property and ownership • Civil transactions	1-5 (Level R - reinforced)	Tests Peer evaluations Class-performance evaluations	Discussions Case studies	PPT– Civil law available on Blackboard Civil code 2015 available on Blackboard
10	**Civil Law (Part II)** • Contracts - Definitions - Formation of contracts - Validity of contracts - Liability for breach of contracts	1-5 (Level M - Mastery)	Tests Peer evaluations Class-performance evaluations	Discussions Case studies	PPT– Civil law available on Blackboard Civil code 2015 available on Blackboard
11	**Civil Law (Part III)** • Inheritance - Testamentary inheritance - Intestacy	1-5 (Level M - Mastery)	Tests Peer evaluations Class-performance evaluations	Discussions Case studies	PPT– Civil law available on Blackboard Civil code 2015 available on Blackboard
12	**Law on Enterprises** • Introduction to law on enterprises • Introduction to forms, features, establishment, reorganization and	1-5 (Level I - Introduced)	Tests Peer evaluations Class-performance evaluations	Discussions Case studies	PPT– Law on enterprises available on Blackboard

	dissolution of an enterprise				Law on enterprises 2020 available on Blackboard
13	**Labor Law** • Definition, and nature of labour law • Employees and employers • Working time, and resting time • Salary (including salary for overtime working hours)	1-5 (Level M - Mastery)	Tests Peer evaluations Class-performance evaluations	Discussions Case studies	PPT– Labor law available on Blackboard Labor code 2019 available on Blackboard
14	**Labour Law** (Cont.) • Employment contracts • Labor disciplines • Dispute settlements	1-5 (Level M - Mastery)	Tests Peer evaluations Class-performance evaluations	Discussions Case studies	PPT– Labor law available on Blackboard Labor code 2019 available on Blackboard
15	**Revision/ Tutoring classes**		Quizzes Projects		

7. **Assessment plan**

Assessment Type	**CLO1**	**CLO2**	**CLO3**	**CLO4**	**CLO5**
In class evaluation (20%)	70% pass	80% pass	100% pass	100% pass	100% pass
Midterm examination (30%)	70% pass	80% pass	100% pass	100% pass	100% pass
Final examination (50%)	70% pass	80% pass	100% pass	100% pass	100% pass

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

8. **Rubrics**

No.	CLOs	Criteria	COMPLETELY FAIL Below 30%	INADEQUATE 30% – 49%	ADEQUATE 50% - 69%	ABOVE AVERAGE 70% - 89%	EXEMPLARY ≥ 90%
1	CLO 1	**Organisation and clarification**	No evidence of organization and coherence	Does not organise ideas logically and with clarification Limited evidence of coherence Ideas lack consistence	Generally organised logically, with evidence of progression Occasionally, there may be a lack of focus or ideas may be tangential	Clear organization and progression. Responds appropriately and relevantly, although some ideas are underdeveloped	Response is focused, detailed and non-tangential. Shows a high degree of attention to logic and reasoning of points. Clearly leads the reader to the conclusion and stirs thought regarding the topic
2		**Originality and usefulness of the analysis**	Shows no ability to identify legal issues or a clear inability to gather the facts	Demonstrates an incomplete grasp of the task. There is no overall sense of creative coherence. Arguments are addressed incompletely.	Shows ability to identify legal issues, gather the facts and develop claims. Argument are addressed well but no links with evidence	Shows strong ability to identify legal issues, gather the fact and develop claims as well as link claims with evidence. Overall, an acceptable solution is offered and explained	Shows strong ability to identify legal issues, gather the facts and develop claims as well as link claims with evidence. Satisfactory solutions are offered and supported
3		**Use of data/information**	Shows no effort to incorporate information from	Shows little information from sources. Poor	Shows moderate amount of source information incorporated.	Draws upon sources to support most points.	Draws upon primary and secondary source information in useful and

			primary and secondary sources	handling of sources	Some key points supported by sources. Quotations may be poorly integrated into paragraphs. Some possible problems with source citations	Some evidence may not support arguments or may appear where inappropriate. Quotations integrated well into paragraphs. Sources cited correctly	illuminating ways to support key points. Excellent integration of quoted material into paragraphs. Source cited correctly
4	CLO 2	**Use of frameworks**	Shows no effort to structure problems in correspondence to theoretical frameworks	Shows limited ability to structure problems in correspondence to theoretical frameworks	Shows effort to link problems with the theoretical frameworks. There are still some mistakes	Shows ability to structure problems in correspondence to theoretical frameworks correctly. Minor mistakes in resolving problems	Shows ability to structure problems in correspondence to theoretical frameworks correctly. The problems are well resolved
5		**Quality of arguments**	Shows no effort to construct logical arguments. Fails to support analysis	Shows little attempt to offer support for key claims or to relate evidence to analysis. Reasons offered are irrelevant.	Shows argument of poor quality. Weak, undeveloped reasons are offered to support key claims	Shows clear, relevant and logical arguments.	Shows identifiable, reasonable and sound arguments. Clear reasons are offered to support key claims.

Chuyên ngành Kỹ Thuật Máy tính

(Chỉ những môn không được liệt kê ở trên)

Course Name: Principles of Electrical Engineering I

Course Code: IT068IU

1. General information

Course designation	This subject covers the fundamental knowledge of electrical engineering
Semester(s) in which the course is taught	2
Person responsible for the course	Dr. Ly Tu Nga
Language	English
Relation to curriculum	Compulsory
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: 135 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 45 (lecture). Private study including examination preparation, specified in hours: 90
Credit points	Number of credits: 3 Lecture: 3 Laboratory: 0
Required and recommended prerequisites for joining the course	Calculus 1
Course objectives	This course covers the following topics: Circuit elements; Independent sources; Dependent sources; Circuit analysis in DC and AC steady state; Operational amplifiers; Power Computations; Two-port circuits; Balanced three-phase circuits. Special seminar(s).
Course learning outcomes	CLO 1. Understand how to use electric equipment, meters, multi-meters, power supplies, oscilloscopes and counters; To study the behavior of some specified circuits. CLO 2. Apply critical and analytic thinking to the principles of electrical engineering process;

CLO 3. Analyze and evaluate creative thinking in the design of electrical engineering solutions;
CLO 4. Have an opportunity to exam case studies to understand the professional and ethical responsibility as an engineer.

Competency level	Course learning outcome (CLO)
Knowledge	CLO1
Skill	CLO2,3
Attitude	CLO4

Content

The description of the contents should clearly indicate the weighting of the content and the level.
Weight: lecture session (~~3~~ hours)
Teaching levels: I (Introduce); T (Teach); U (Utilize)

Content	Weight	Level
Introduction to EE051IU: Circuit variables	1	I
Simple resistive circuits.	1	T
Techniques of circuit analysis	2	T,U
The operational amplifier.	1	T
Inductance, capacitance and mutual inductance.	1	T
Sinusoidal steady-state analysis.	1	T
Sinusoidal steady-state power calculations.	1	T,U
Two-port circuits.	1	T
Balanced three-phase circuits: three-phase voltage sources, analysis of the wye-wye and wye- delta circuit, power calculation and measurements.	2	T
Response of first-order RL and RC circuit: natural and step responses, sequential switching and unbounded response.	1	T
Introduction to Laplace transform: definition, step and impulse functions, functional and operational transform, inverse transform, poles and zeros, initial and final value theorems.	1	T
Term project presentation	1	
Review / Questions & Answers	1	

Examination forms

Multiple-choice questions, short-answer questions

Study and examination requirements

Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.

	Assignments/Examination: Students must have more than 50/100 points overall to pass this course.
Reading list	1. J. W. Nilsson and S. A. Riedel, Electric Circuits 9th, 2011 2. R. C. Dorf and J. A. Svoboda, Introduction to Electric Circuits 9th, 2014

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO					
CLO	1	2	3	4	5	6
1	✓	✓				
2	✓	✓				
3			✓			✓
4			✓			✓

3. Planned learning activities and teaching methods

Week	Content	CLO	Teaching and learning activities	Assessment	Resources
1	Introduction to EE051IU: Circuit variables	CLO 1	-Lecture -Class discussion		[1]
2	Simple resistive circuits.	CLO 1	- Lecture - Class discussion	Homework	[1]
3 & 4	Techniques of circuit analysis	CLO 1, CLO 2	- Lecture - Class discussion	Quiz 1	[1]
5	The operational amplifier.	CLO 1, CLO 2	- Lecture - Class discussion	Homework	[1]
6	Inductance, capacitance and mutual inductance.	CLO 1, CLO 2	- Lecture - Class discussion	Homework	[1]
7	Sinusoidal steady-state analysis.	CLO 1, CLO 2	- Lecture - Class discussion	Homework	[1]
Midterm exam		**CLO 1; CLO 2**		**Written exam**	

8	Sinusoidal steady-state power calculations.	CLO 1, CLO 2	- Lecture - Class discussion	Quiz 2	[1,2]
9	Two-port circuits.	CLO 1, CLO 2	- Lecture - Class discussion	Quiz 3	[1,2]
10-11	Balanced three-phase circuits: three-phase voltage sources, analysis of the wye-wye and wye-delta circuit, power calculation and measurements.	CLO 1, CLO 2, CLO 3	- Lecture - Class discussion	Homework	[1,2]
12	Response of first-order RL and RC circuit: natural and step responses, sequential switching and unbounded response.	CLO 1, CLO 2, CLO 3	- Lecture - Class discussion	Homework	[1,2]
13	Introduction to Laplace transform: definition, step and impulse functions, functional and operational transform, inverse transform, poles and zeros, initial and final value theorems.	CLO 1, CLO 2, CLO 3	- Lecture - Class discussion	Homework	[1,2]
14	Term project presentation	CLO 1, CLO 2, CLO 3	Group presentation	Term project presentation	[1,2]
15	Review / Questions & Answers	CLO 1, CLO 2	- Lecture - Class discussion	Homework	
FINAL EXAMINATION				**Written exam**	

4. Assessment plan

(Hint)

Assessment Type	**CLO1**	**CLO2**	**CLO3**	**CLO4**

Midterm examination (30%)	30%	30%	30%	50%
Final examination (40%)	40%	40%	40%	50%
Exercises/ Quiz (30%)	30%	30%	30%	

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

Rubrics (optional)

1. Grading checklist

Grading checklist for Written Reports			
Student: …….. Date: ……	HW/Assignment: ……. Evaluator: ……		
	Max.	**Score**	**Comments**
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)	10		
TOTAL SCORE	100		

2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	**Description**
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.

2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	Issue/ problem to be considered critically is stated without clarification or description.
Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation / evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.

Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's	Conclusion is logically tied to a range of information, including opposing viewpoints; related	Conclusion is logically tied to information (because information is chosen to fit the	Conclusion is inconsistently tied to some of the information discussed; related outcomes

	informed evaluation and ability to place evidence and perspectives discussed in priority order.	outcomes (consequences and implications) are identified clearly.	desired conclusion); some related outcomes (consequences and implications) are identified clearly.	(consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.

Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable,	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

	and strongly supported.)			

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022

Dean of School of Computer Science and Engineering

Assoc.Prof. Nguyen Van Sinh

Course Name: Principles of Electrical Engineering I Laboratory

Course Code: IT098IU

1. General information

Course designation	This subject covers the fundamental knowledge of electrical engineering laboratory
Semester(s) in which the course is taught	2
Person responsible for the course	Dr. Ly Tu Nga
Language	English
Relation to curriculum	Compulsory (CE)
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	Total workload: 60 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 30 (laboratory) Private study including examination preparation, specified in hours: 30
Credit points	Number of credits : 1 Lecture: 0 Laboratory: 1
Required and recommended prerequisites for joining the course	Calculus 1
Course objectives	This course helps students to understand better the course Principles of Electrical Engineering I. Experimental exercises in use of laboratory instruments. Voltage, current, impedance, frequency, and waveform measurements. Rudiments of circuit modeling and design.
Course learning outcomes	CLO 1. Understand how to use electric equipment, meters, multi-meters, power supplies, oscilloscopes and counters; To study the behavior of some specified circuits. CLO 2. Apply critical and analytic thinking to the principles of electrical engineering process; CLO 3. Analyze and evaluate creative thinking in the design of electrical engineering solutions; CLO 4. Have an opportunity to exam case studies to understand the professional and ethical responsibility as an engineer.

Competency level	**Course learning outcome (CLO)**
Knowledge	CLO1
Skill	CLO2,3

	Attitude	CLO4

Content

The description of the contents should clearly indicate the weighting of the content and the level.
Weight: lecture session (3 hours)
Teaching levels: I (Introduce); T (Teach); U (Utilize)

Topic	Weight	Level
Introduction	1	I
Kirchoff's current and voltage laws	1	T
Frequency and phase shift measurement	1	T,U
Thevenin's theorem	1	T
Mesh and nodal analysis of AC circuits	2	T
Operational Amplifiers	2	T
Circuits utilizing op-amps	1	T,U
Professional and ethical case studies	1	T

Examination forms

Multiple-choice questions, short-answer questions

Study and examination requirements

Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.
Assignments/Examination: Students must have more than 50/100 points overall to pass this course.

Reading list

[1] Yasir, Sultan, Principles of Electrical Engineering Lab. Manual, Book, 2019

2. Learning Outcomes Matrix (optional)

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO					
CLO	1	2	3	4	5	6
1	✓	✓				
2	✓	✓				
3			✓			✓
4			✓			✓

3. Planned learning activities and teaching methods

Week	Topic	CLO	Teaching and learning activities	Assessments	Resources
1	Introduction	CLO1	-Lecture		[1]

			-Class discussion		
2	Kirchoff's current and voltage laws	CLO1,2,3	-Practice -Class discussion	Report	[1]
3	Frequency and phase shift measurement	CLO1,2,3	-Practice -Class discussion	Report	[1]
5	Thevenin's theorem	CLO1,2,3	-Practice -Class discussion	Report	[1]
6	Mesh and nodal analysis of AC circuits	CLO1,2,3	-Practice -Class discussion	Report	[1]
7	Operational Amplifiers	CLO1,2,3	-Practice -Class discussion	Report	[1]
8	Circuits utilizing op-amps	CLO1,2,3	-Practice -Class discussion	Report	[1]
9	Professional and ethical case studies	CLO1,2,3	-Practice -Class discussion	Report	[1]
10	**Final exam**			**Written exam**	

4. Assessment plan

Assessment Type

Assessment Type	**CLO1**	**CLO2**	**CLO3**	**CLO4**
Lab. Assignments (70%)	80%	50%	50%	50%
Final examination (30%)	20%	50%	50%	50%

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

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1. When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.↩

Rubrics (optional)

1. Grading checklist

Grading checklist for Written Reports

Student: ……..	HW/Assignment:
Date: ……	…….
	Evaluator:
	……

	Max.	Score	Comments
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)	10		
TOTAL SCORE	100		

2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	**Description**
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**

Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	Issue/ problem to be considered critically is stated without clarification or description.
Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation / evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts

	presenting a position.		others' assumptions than one's own (or vice versa).	when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	Milestone		Benchmark
	4	3	2	1
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.

	polished and confident.			
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022

Dean of School of Computer Science and Engineering

Assoc.Prof. Nguyen Van Sinh

Course Name: Electronics Devices

Course Code: IT074IU

1. General information

Course designation	This subject covers the fundamental knowledge of electronics devices
Semester(s) in which the course is taught	5
Person responsible for the course	Dr. Ly Tu Nga
Language	English
Relation to curriculum	Compulsory
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: 135 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 45 (lecture). Private study including examination preparation, specified in hours: 90
Credit points	Number of credits: 3 Lecture: 3 Laboratory: 0
Required and recommended co-requisites for joining the course	Electronics Devices Laboratory (Co-requisite)
Course objectives	Fundamentals of semiconductor devices and microelectronic circuits, characteristics of p-n, Zener diodes, and analog diode circuits. Principles of MOSFET and BJT operation, biasing, transistor analysis at midband frequencies.
Course learning outcomes	CLO 1. Understand how to use electric equipment, meters, multi-meters, power supplies, oscilloscopes and counters; To study the behavior of some specified circuits. CLO 2. Apply critical and analytic thinking to the electronics devices process; CLO 3. Analyze and evaluate creative thinking in the design of electronic devices solutions; CLO 4. Have an opportunity to exam case studies to understand the professional and ethical responsibility as an engineer.

Competency level	Course learning outcome (CLO)
Knowledge	CLO1
Skill	CLO2,3
Attitude	CLO4

Content

The description of the contents should clearly indicate the weighting of the content and the level.
Weight: lecture session (~~3~~ hours)
Teaching levels: I (Introduce); T (Teach); U (Utilize)

Topic	Weight	Level
Frequency selective circuits, passive filter design.	1	I,T
Active filter circuits.	1	T
Fourier Series.	1	T
Analog and digital signals, amplifiers, circuit models for amplifiers, network theorems.	1	T
Operational Amplifiers, Ideal Op Amp, inverting & non-inverting configurations, Op Amp circuits, non-ideal performance.	1	T
Diodes, Ideal diode, terminal characteristics, analysis of diode circuits, small signal analysis.	1	T
PN junction under reverse-bias, PN junction under forward bias, zener diodes, Diode applications, diode circuit design.	1	T
Bipolar Junction Transistors; Physical structures and models of operation, PNP & NPN transistors	1	T
DC analysis, BJT as an amplifier.	1	T
Single stage amplifier configurations; BJT in cut-off and saturation; BJT circuit applications and circuit design.	1	T
Field-Effect Transistors, structure and physical operation of enhancement-type and depletion type MOSFET.	1	T
FET circuit in DC.	1	T,U
FET as an amplifier, biasing circuits and biasing design; Basic configuration of single-stage FET amplifiers.	1	T,U

	Basic configuration of single-stage FET amplifiers; FET circuit design, CMOS and CMOS Applications.	1	T,U
	Pspice simulations.	1	T
Examination forms	Multiple-choice questions, short-answer questions		
Study and examination requirements	Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. Assignments/Examination: Students must have more than 50/100 points overall to pass this course.		
Reading list	1. A. S. Sedra and K. C. Smith, Microelectronic Circuits 6th, 2009 2. J. W. Nilsson and S. A. Riedel, Electric Circuits 9th, 2011 3. R. C. Dorf and J. A. Svoboda, Introduction to Electric Circuits 9th, 2014		

2. Learning Outcomes Matrix (optional)

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO					
CLO	1	2	3	4	5	6
1	✓	✓				
2	✓	✓				
3			✓			✓
4			✓			✓

3. Planned learning activities and teaching methods

Week	**Topic**	**CLO**	**Teaching and Learning activities**	**Assessments**	**Resources**
1	Frequency selective circuits, passive filter design.	CLO 1	-Lecture -Class discussion		[2,3]
2	Active filter circuits.	CLO 1	- Lecture - Class discussion	Homework	[2,3]
3	Fourier Series.	CLO 1, CLO 2	- Lecture - Class discussion	Quiz 1	[2,3]

4	Analog and digital signals, amplifiers, circuit models for amplifiers, network theorems.	CLO 1	- Lecture - Class discussion	Homework	[1]
5	Operational Amplifiers, Ideal Op Amp, inverting & non-inverting configurations, Op Amp circuits, non-ideal performance.	CLO 1, CLO 2	- Lecture - Class discussion	Quiz 2	[1]
6	Diodes, Ideal diode, terminal characteristics, analysis of diode circuits, small signal analysis.	CLO 1	- Lecture - Class discussion	Homework	[1]
7	PN junction under reverse-bias, PN junction under forward bias, zener diodes, Diode applications, diode circuit design.	CLO 1	- Lecture - Class discussion	Homework	[1]
8	**Midterm**		**Written exam**		
9	Bipolar Junction Transistors; Physical structures and models of operation, PNP & NPN transistors	CLO 1,2	- Lecture - Class discussion	Quiz 3	[1]
10	DC analysis, BJT as an amplifier.				[1]
11	Single stage amplifier configurations; BJT in cut-off and saturation; BJT circuit applications and circuit design.	CLO 1	- Lecture - Class discussion		[1]
12	Field-Effect Transistors, structure and physical operation of enhancement-type and depletion type MOSFET.	CLO 1	- Lecture - Class discussion	Homework	[1]
13	FET circuit in DC.	CLO 1	- Lecture - Class discussion		[1]
14	FET as an amplifier, biasing circuits and biasing design; Basic	CLO 1,2	- Lecture - Class discussion	Quiz 4	[1]

	configuration of single-stage FET amplifiers.				
15	Basic configuration of single-stage FET amplifiers; FET circuit design, CMOS and CMOS Applications.	CLO 1	- Lecture - Class discussion	Homework	[1]
16	Pspice simulations.	CLO 1,2,3	- Lecture - Class discussion		[1]
17	**Final exam**		**Written exam**		

4. Assessment plan

Assessment Type

Assessment Type	**CLO1**	**CLO2**	**CLO3**	**CLO4**
Midterm examination (30%)	30%	30%	30%	50%
Final examination (40%)	40%	40%	40%	50%
Exercises/ Quiz (30%)	30%	30%	30%	

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

Rubrics (optional)

1. Grading checklist

Grading checklist for Written Reports			
Student: ……..	HW/Assignment:		
Date: ……	…….		
	Evaluator:		
	……		
	Max.	**Score**	**Comments**
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		

Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)	10		
TOTAL SCORE	100		

2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	**Description**
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	Issue/ problem to be considered critically is stated without clarification or description.

Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation / evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective,	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.

	thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	(perspective, thesis/ hypothesis).		
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequence s and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequence s and implications) are oversimplifie d.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.

	presentation cohesive.			
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities)	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference

	make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022

Dean of School of Computer Science and Engineering

Assoc.Prof. Nguyen Van Sinh

Course Name: Electronics Devices Laboratory

Course Code: IT101IU

1. General information

Course designation	This subject covers the fundamental knowledge of electronics devices
Semester(s) in which the course is taught	5
Person responsible for the course	Dr. Ly Tu Nga
Language	English
Relation to curriculum	Compulsory
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	Total workload: 60 Contact hours: 30 (laboratory) Private study including examination preparation, specified in hours: 30
Credit points	Number of credits: 1 Lecture: 0 Laboratory: 1
Required and recommended prerequisites for joining the course	Electronic Devices
Course objectives	Laboratory experiments in microelectronic circuits using semiconductor devices, including diodes, MOSFETs and BJTs. Employing a learn-by-doing approach, emphasizing the hands-on-experimental experiences and computer simulation.
Course learning outcomes	CLO 1. Understand how to use electric equipment, meters, multi-meters, power supplies, oscilloscopes and counters; To study the behavior of some specified circuits. CLO 2. Apply critical and analytic thinking to the electronics devices process; CLO 3. Analyze and evaluate creative thinking in the design of electronic devices solutions; CLO 4. Have an opportunity to exam case studies to understand the professional and ethical responsibility as an engineer.

Competency level	Course learning outcome (CLO)
Knowledge	CLO1
Skill	CLO2,3
Attitude	CLO4

Content	*The description of the contents should clearly indicate the weighting of the content and the level.* Weight: lecture session (~~3~~ hours) Teaching levels: I (Introduce); T (Teach); U (Utilize)

Topic	**Weight**	**Level**
Introduction and Laboratory Equipment.	1	I,T
RC Circuits and Operational Amplifier.	1	T,U
Semiconductor Junction Diode.	2	T,U
Bipolar Junction Transistors: I-V Characteristics and Biasing.	1	T,U
Bipolar Junction Transistors: Amplifier Topologies.	1	T,U
MOSFET Transistors.	2	T,U
Professional and ethical case studies	1	T,U
Review.	1	

Examination forms	Multiple-choice questions, short-answer questions
Study and examination requirements	Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. Assignments/Examination: Students must have more than 50/100 points overall to pass this course.
Reading list	[1] R.ChinnaRao, ELECTRONIC DEVICES AND CIRCUITS LABORATORY MANUAL, 2019.

2. Learning Outcomes Matrix (optional)

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO					
CLO	1	2	3	4	5	6
1	✓	✓				
2	✓	✓				
3			✓			✓
4			✓			✓

3. Planned learning activities and teaching methods

Week	**Topic**	**CLO**	**Teaching and Learning activities**	**Assessments**	**Resources**

1	Introduction and Laboratory Equipment.	CLO1	-Lecture -Class discussion		[1]
2	RC Circuits and Operational Amplifier.	CLO1,2,3	-Practice -Class discussion	-Report	[1]
3	Semiconductor Junction Diode.	CLO1,2,3	-Practice -Class discussion	-Report	[1]
4	Bipolar Junction Transistors: I-V Characteristics and Biasing.	CLO1,2,3	-Practice -Class discussion	-Report	[1]
5	Bipolar Junction Transistors: Amplifier Topologies.	CLO1,2,3	-Practice -Class discussion	-Report	[1]
6	MOSFET Transistors.	CLO1,2,3	-Practice -Class discussion	-Report	[1]
7	Professional and ethical case studies	CLO2,3,4	-Practice -Class discussion	-Report	[1]
8	Review.	CLO1,2,3	-Practice -Class discussion	-Report	[1]
9	**Final exam**		-Practice	**Written exam**	

4. Assessment plan

Assessment Type

Assessment Type	**CLO1**	**CLO2**	**CLO3**	**CLO4**
Lab. Assignments (70%)	70%	70%	70%	70%
Final examination (30%)	30%	30%	30%	30%

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

Rubrics (optional)

1. Grading checklist

Grading checklist for Written Reports	
Student: ……..	HW/Assignment:
Date: ……	…….

	Evaluator: ……		
	Max.	**Score**	**Comments**
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)	10		
TOTAL SCORE	100		

2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	**Description**
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**

Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	Issue/ problem to be considered critically is stated without clarification or description.
Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation / evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts

	presenting a position.		others' assumptions than one's own (or vice versa).	when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	Milestone		Benchmark
	4	3	2	1
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.

	polished and confident.			
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022

Dean of School of Computer Science and Engineering

Assoc.Prof. Nguyen Van Sinh

Course Name: Micro-processing Systems

Course Code: IT128IU

1. General information

Course designation	This subject covers the fundamental knowledge of Micro-processing system
Semester(s) in which the course is taught	4
Person responsible for the course	Assoc. Prof. Dinh Duc Anh Vu
Language	English
Relation to curriculum	Compulsory (CE)
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	Total workload: 135 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 45 (lecture) Private study including examination preparation, specified in hours: 90
Credit points	Number of credits : 3 Lecture: 3 Laboratory: 0
Required and recommended co-requisites or prerequisites for joining the course	Co-requisites: Micro-processing System Laboratory
Course objectives	This course provides students the fundamentals of microprocessors and microcomputers; data flow; machine programming; assembly languages, architectures and instructions sets; stacks, subroutines, I/O, and interrupts; interfacing fundamentals; designing with microprocessors, and applications of micro-processing systems to some practical problems.
Course learning outcomes	CLO 1. Understand the operation of a basic computer organization. CLO 2. Apply the assembly language to solve a specific problem. CLO 3. Design the micro-processing systems for a specific purpose CLO 4. Have an opportunity to exam case studies to understand the professional and ethical responsibility as an engineer. **Competency level** | **Course learning outcome (CLO)**

	Knowledge	CLO1
	Skill	CLO2,3
	Attitude	CLO4

Content

The description of the contents should clearly indicate the weighting of the content and the level.
Weight: lecture session (~~3~~ hours)
Teaching levels: I (Introduce); T (Teach); U (Utilize)

Topic	**Weight**	**Level**
Orientation	1	I
Introduction	1	I
Basic Computer Organization	1	T
The Pentium Processor	1	T
Overview of Assembly Language	1	T
Procedures and the Stack	2	T,U
Addressing Modes	1	T,U
Arithmetic Flags and Instruction	1	T,U
Selection and Iteration	1	T,U
Logical and Bit Operations	1	T,U
String Processing	1	T
ASCII and BCD Arithmetic	1	T,U
High-Level Language Interface	1	T,U
Final Exam Review	1	T

Examination forms

Multiple-choice questions, short-answer questions

Study and examination requirements

Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.
Assignments/Examination: Students must have more than 50/100 points overall to pass this course.

Reading list

1. Dandamudi, Introduction to Assembly Language Programming 2nd, 2004
2. Irvine, Assembly Language for Intel-Based Computers 4th, 2003

2. Learning Outcomes Matrix (optional)

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO					
CLO	1	2	3	4	5	6

1	✓	✓				
2	✓	✓				
3			✓			✓
4			✓			✓

3. Planned learning activities and teaching methods

Week	**Topic**	**CLO**	**Teaching and learning activities**	**Assessments**	**Resources**
1	Orientation	CLO1	-Lecture -Class discussion		[1]
2	Introduction	CLO1	- Lecture - Class discussion		[1]
3	Basic Computer Organization	CLO1,2	- Lecture - Class discussion	Homework	[1]
4	The Pentium Processor	CLO1,2	- Lecture - Class discussion	Quiz 1	[1]
5	Overview of Assembly Language	CLO1,2	- Lecture - Class discussion		[1]
6	Procedures and the Stack	CLO1,2,3	- Lecture - Class discussion	Homework	[1]
7	**Midterm**			**Written exam**	
8	Addressing Modes	CLO1,2	- Lecture - Class discussion	Quiz 2	[1]
9	Arithmetic Flags and Instruction	CLO1,2,3	- Lecture - Class discussion		[1]
10	Selection and Iteration	CLO2,3,4	- Lecture - Class discussion	Homework	[1]
11	Logical and Bit Operations	CLO2,3,4	- Lecture - Class discussion		[1]
12	String Processing	CLO2,3,4	- Lecture - Class discussion	Quiz 3	[1]
13	ASCII and BCD Arithmetic	CLO2,3,4	- Lecture		[1]

			- Class discussion		
14	High-Level Language Interface	CLO2,3,4	- Lecture - Class discussion	Homework	[1]
15	Final Exam Review	CLO2,3,4	- Lecture - Class discussion		
16	**Final exam**			**Written exam**	

4. Assessment plan

Assessment Type

Assessment Type	**CLO1**	**CLO2**	**CLO3**	**CLO4**
Midterm examination (30%)	30%	30%	30%	30%
Final examination (40%)	40%	40%	40%	40%
Exercises/ Quiz (30%)	30%	30%	30%	30%

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

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1. When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.↩

Rubrics (optional)

1. Grading checklist

Grading checklist for Written Reports			
Student: …….. Date: ……	HW/Assignment: ……. Evaluator: ……		
	Max.	**Score**	**Comments**
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		

Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)	10		
TOTAL SCORE	100		

2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	**Description**
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	Issue/ problem to be considered critically is stated without clarification or description.

Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation / evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective,	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.

	thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	(perspective, thesis/ hypothesis).		
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequence s and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequence s and implications) are oversimplifie d.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.

	presentation cohesive.			
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities)	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference

	make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022

Dean of School of Computer Science and Engineering

Assoc.Prof. Nguyen Van Sinh

Course Name: Micro-processing Systems Lab

Course Code: IT129IU

1. General information

Course designation	This subject covers the fundamental knowledge of Micro-processing system Laboratory
Semester(s) in which the course is taught	4,6
Person responsible for the course	Assoc. Prof. Dinh Duc Anh Vu
Language	English
Relation to curriculum	Compulsory (CE)
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	Total workload: 60 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 30 (laboratory) Private study including examination preparation, specified in hours: 30
Credit points	Number of credits : 1 Lecture: 0 Laboratory: 1
Required and recommended co-requisites for joining the course	Micro-processing System
Course objectives	In this course the students will study and do experiments with ARM microcontroller development KIT. Student will be able to practice with following topics : assembly languages, architectures and instructions sets; stacks, subroutines, I/O, and interrupts; peripheral interfacing fundamentals; designing with microprocessors, and applications of micro-processing systems to some practical problems.
Course learning outcomes	CLO 1. An ability to design and conduct experiments with microcontroller as well as to analyze and interpret data CLO 2. An ability to identify, formulate, and solve engineering problems using microcontroller based solutions CLO 3. Implement assembly language to solve a specific problem CLO 4. Have an opportunity to exam case studies to understand the professional and ethical responsibility as an engineer.

Competency level	Course learning outcome (CLO)
Knowledge	CLO2

	Skill	CLO1,3
	Attitude	CLO4

Content

The description of the contents should clearly indicate the weighting of the content and the level.
Weight: lecture session (3 hours)
Teaching levels: I (Introduce); T (Teach); U (Utilize)

Topic	**Weight**	**Level**
Introduction to KIT, Softs, and installing devices	1	I,T
General Input/Output; SPI interface	2	T,U
Memory interfacing, programming: addressing modes; UART interfaces	1	T,U
Interrupts and applications	1	T,U
Timers and applications	1	T,U
ADC conversion (polling and interrupt method) and applications	1	T,U
Sensors and applications	2	T,U
Professional and ethical case studies	1	T,U

Examination forms

Multiple-choice questions, short-answer questions

Study and examination requirements

Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.
Assignments/Examination: Students must have more than 50/100 points overall to pass this course.

Reading list

1. Muhammad Ali Mazidi and, Sarmad Naimi and Sepehr Naimi, The AVR Microcontroller and Embedded Systems: Using Assembly and C 1st, 2010

2. Learning Outcomes Matrix (optional)

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO					
CLO	1	2	3	4	5	6
1	✓	✓				
2	✓	✓				
3			✓			✓
4			✓			✓

3. Planned learning activities and teaching methods

Week	Topic	CLO	Teaching and learning activities	Assessments	Resources
1	Introduction to KIT, Softs, and installing devices	CLO1	-Lecture -Class discussion		[1]
2	General Input/Output; SPI interface	CLO2,3,4	-Practice -Class discussion	-Report	[1]
3	Memory interfacing, programming: addressing modes; UART interfaces	CLO2,3,4	-Practice -Class discussion	-Report	[1]
4	Interrupts and applications	CLO2,3,4	-Practice -Class discussion	-Report	[1]
5	Timers and applications	CLO2,3,4	-Practice -Class discussion	-Report	[1]
6	ADC conversion (polling and interrupt method) and applications	CLO2,3,4	-Practice -Class discussion	-Report	[1]
7	Sensors and applications	CLO2,3,4	-Practice -Class discussion	-Report	[1]
8	Professional and ethical case studies	CLO4	-Practice -Class discussion	-Report	[1]
9	**Final exam**		-Practice	-Written exam	

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
Lab. Assignments (70%)	70%	70%	70%	70%
Final examination (30%)	30%	30%	30%	30%

Assessment Type

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

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1. When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual

questions to lecturers after the class, all mean that about 60 minutes should be counted.↩

Rubrics (optional)

1. Grading checklist

Grading checklist for Written Reports			
Student: …….. Date: ……	HW/Assignment: ……. Evaluator: ……		
	Max.	**Score**	**Comments**
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)	10		
TOTAL SCORE	100		

2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	**Description**
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	Issue/ problem to be considered critically is stated without clarification or description.
Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation / evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others'	Identifies own and others' assumptions and several relevant contexts when	Questions some assumptions. Identifies several relevant	Shows an emerging awareness of present assumptions (sometimes

	assumptions and carefully evaluates the relevance of contexts when presenting a position.	presenting a position.	contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

	discussed in priority order.		implications) are identified clearly.	

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye	Delivery techniques (posture, gesture, eye	Delivery techniques (posture, gesture, eye	Delivery techniques (posture, gesture, eye contact, and

	contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022

Dean of School of Computer Science and Engineering

Assoc.Prof. Nguyen Van Sinh

Course Name: Digital System Design

Course Code: IT105IU

1. General information

Course designation	This course introduces methodology and techniques to design digital systems
Semester(s) in which the course is taught	6
Person responsible for the course	Assoc. Prof. Vo Thi Luu Phuong
Language	English
Relation to curriculum	Compulsory (CE)
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	Total workload: 135 Contact hours: 45 (lecture) Private study including examination preparation, specified in hours: 90
Credit points	Number of credits: 3 Lecture: 3 Laboratory: 0
Required and recommended prerequisites for joining the course	Digital Logic Design
Parallel course	Digital System Design Lab
Course objectives	This course introduces methodology and techniques to design digital systems. The topics including the basic concepts, analysis, and system design with hardware description languages (HDL). The course provides an insight of the design of asynchronous sequential circuits and complex synchronous systems. Design process is introduced by concepts, documents, and simulation. .
Course learning outcomes	CLO 1. An ability to define different number systems, binary addition and subtraction, 2's complement representation and operations with this representation. CLO 2. An ability to understand the different switching algebra theorems and apply them for logic functions. CLO 3. An ability to define the Karnaugh map for a few variables and perform an algorithmic reduction of logic functions. CLO 4. An ability to understand sequential circuits, such as counters and shift registers, and to perform simple projects using standard logic and integrated chips.

CLO 5. An ability to analyze and design asynchronous sequential digital elements
CLO 6. An ability to analyze and design synchronous digital elements
CLO 7. An ability to write and verify synthesizable VHDL models
CLO 8. An ability to effectively use VHDL simulator

Competency level	Course learning outcome (CLO)
Knowledge	CLO 1, 2, 3
Skill	CLO 4, 5, 6
Attitude	CLO 7, 8

Content

The description of the contents should clearly indicate the weighting of the content and the level.
Weight: lecture session (3 hours)
Teaching levels: I (Introduce); T (Teach); U (Utilize)

Topic	Weight	Level
Number systems, Binary and Hexadecimal	1	I
Number systems, Binary and Hexadecimal	1	I
Switching algebra, Theorems, Standard representation of logic functions.	1	T
Boolean algebra, Combinational circuits, Truth table, Karnaugh maps, Minimization techniques.	1	T
Binary and Hexadecimal arithmetic	1	T
Synchronous Sequential Logic.	2	T,U
Asynchronous Sequential Logic.	1	T,U
Counters: serial and parallel, Design examples, Shift registers.	1	T,U
Asynchronous State Machines	1	T,U
Multiple Clock Domains	1	T,U
Hardward Description Languages	1	T
Guidelines for VHDL-based Design	1	T,U
Programmable Device Technologies and Introduction to the Altera FPGA	1	T,U

Examination forms

Multiple-choice questions, short-answer questions

Study and examination requirements

Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.
Assignments/Examination: Students must have more than 50/100 points overall to pass this course.

Reading list

[1] M.M. Mano and M.D. Ciletti, Digital Design 4th, 2007

	[2] Zwolinski M, Digital System Design with VHDL 2nd, 2004 [3] R.J Tocci and N.S. Widner, Digital Systems - Principles and Applications 8th, 2001 [4] J.F. Wakerly, Digital Design Principles & Practices 4th, 2004

2. Learning Outcomes Matrix (optional)

The relationship between Course Learning Outcomes (CLO) (1-8) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO					
CLO	1	2	3	4	5	6
1		✓				
2		✓				
3		✓				
4		✓				
5		✓				✓
6		✓				✓
7						✓
8						✓

3. Planned learning activities and teaching methods

Week	**Topic**	**CLO**	**Assessments**	**Learning activities**	**Resources**
1	Number systems, Binary and Hexadecimal	CLO1	Homework	-Lecture -Class discussion	[1]
2	Number systems, Binary and Hexadecimal	CLO1, 2	Homework	-Lecture -Class discussion	[1]
3	Switching algebra, Theorems, Standard representation of logic functions.	CLO3, 4	Homework	-Lecture -Class discussion	[1]
4	Boolean algebra, Combinational circuits, Truth table, Karnaugh maps, Minimization techniques.	CLO3, 4	Homework	-Lecture -Class discussion	[1]
5	Binary and Hexadecimal arithmetic	CLO3, 4	Homework	-Lecture -Class discussion	[1]
6	**Midterm**		**Written exam**		

7	Synchronous Sequential Logic.	CLO5, 6	Homework	-Lecture -Class discussion	[1]
8	Asynchronous Sequential Logic.	CLO5, 6	Homework	-Lecture -Class discussion	[1]
9	Counters: serial and parallel, Design examples, Shift registers.	CLO5, 6	Homework	-Lecture -Class discussion	[1]
10	Asynchronous State Machines	CLO7, 8	Homework	-Lecture -Class discussion	[1]
11	Multiple Clock Domains	CLO5, 6	Homework	-Lecture -Class discussion	[1]
12	Hardward Description Languages	CLO7, 8	Homework	-Lecture -Class discussion	[1]
13	Guidelines for VHDL-based Design	CLO7, 8	Homework	-Lecture -Class discussion	[1]
14	Programmable Device Technologies and Introduction to the Altera FPGA	CLO7, 8	Homework	-Lecture -Class discussion	[1]
15	**Final exam**		**Written exam**		

4. Assessment plan

Assessment Type

Assessment Type	**CLO1**	**CLO2**	**CLO3**	**CLO4**	**CLO5**	**CLO6**	**CLO7**	**CLO8**
Midterm examination (30%)	30%	30%	30%	30%	30%	30%	30%	30%
Final examination (40%)	40%	40%	40%	40%	40%	40%	40%	40%
Exercises/ Quiz (30%)	30%	30%	30%	30%	30%	30%	30%	30%

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

Rubrics (optional)

1. Grading checklist

Grading checklist for Written Reports			
Student: …….. Date: ……	HW/Assignment: ……. Evaluator: ……		
	Max.	**Score**	**Comments**
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)	10		
TOTAL SCORE	100		

2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	**Description**
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	Milestone		Benchmark
	4	3	2	1
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	Issue/ problem to be considered critically is stated without clarification or description.
Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation / evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position.	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to

	contexts when presenting a position.		May be more aware of others' assumptions than one's own (or vice versa).	identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	Milestone		Benchmark
	4	**3**	**2**	**1**
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and

	appears polished and confident.	appears comfortable.	appears tentative.	speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022

Dean of School of Computer Science and Engineering

Assoc.Prof. Nguyen Van Sinh

Course Name: Digital System Design Lab

Course Code: IT106IU

1. General information

Course designation	This course introduces methodology and techniques to design digital systems
Semester(s) in which the course is taught	6
Person responsible for the course	Assoc. Prof. Vo Thi Luu Phuong
Language	English
Relation to curriculum	Compulsory (CE)
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: 60 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 30 (laboratory) Private study including examination preparation, specified in hours: 30
Credit points	Number of credits : 1 Lecture: 0 Laboratory: 1
Required and recommended prerequisites for joining the course	Digital Logic Design Digital Logic Design Lab
Parallel course	Digital System Design
Course objectives	This lab helps students understand better about techniques to design digital systems. This lab includes software and hardware topics: Introduction to Maxplus II software, Counter, Introduction to VHDL in Maxplus II, Digital Clock.
Course learning outcomes	CLO 1. Ability to describe a digital system in VHDL CLO 2. Ability to simulate and debug a digital system described in VHDL CLO 3. Ability to interface electronic components with custom hardware. CLO 4. Ability to implement logic on an FPGA CLO 5. Ability to analyze timing of digital systems, including cross-boundary, asynchronous timing

Competency level	Course learning outcome (CLO)
Knowledge	CLO1, 2
Skill	CLO3, 4
Attitude	CLO5

Content

The description of the contents should clearly indicate the weighting of the content and the level.
Weight: lecture session (3 hours)
Teaching levels: I (Introduce); T (Teach); U (Utilize)

Topic	Weight	Level
Number systems, Binary and Hexadecimal	1	I, T
Switching algebra, Theorems, Standard representation of logic functions.	1	I, T
Boolean algebra, Combinational circuits, Truth table, Karnaugh maps, Minimization techniques.	1	I, T
Counters: serial and parallel, Design examples, Shift registers.	1	T, U
Asynchronous State Machines	1	T, U
Multiple Clock Domains	1	T, U
Hardward Description Languages	1	T, U
Guidelines for VHDL-based Design	1	T, U
Programmable Device Technologies and Introduction to the Altera FPGA	1	T, U

Examination forms

Report

Study and examination requirements

Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.
Assignments/Examination: Students must have more than 50/100 points overall to pass this course.

Reading list

1. M.M. Mano and M.D. Ciletti, Digital Design 4th, 2007
2. Zwolinski M, Digital System Design with VHDL 2nd, 2004
3. R.J Tocci and N.S. Widner, Digital Systems - Principles and Applications 8th, 2001
4. J.F. Wakerly, Digital Design Principles & Practices 4th, 2004

2. Learning Outcomes Matrix (optional)

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO					
CLO	1	2	3	4	5	6
1		✓				
2		✓				
3		✓				✓
4		✓				✓
5						✓

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
1	Number systems, Binary and Hexadecimal	CLO1	-Report	-Practice -Class discussion	[1]
2	Switching algebra, Theorems, Standard representation of logic functions.	CLO1	-Report	-Practice -Class discussion	[1]
3	Boolean algebra, Combinational circuits, Truth table, Karnaugh maps, Minimization techniques.	CLO2	-Report	-Practice -Class discussion	[1]
4	Counters: serial and parallel, Design examples, Shift registers.	CLO3	-Report	-Practice -Class discussion	[1]
5	Asynchronous State Machines	CLO4	-Report	-Practice -Class discussion	[1]
6	Multiple Clock Domains	CLO4	-Report	-Practice -Class discussion	[1]
7	Hardward Description Languages	CLO3, 4	-Report	-Practice -Class discussion	[1]
8	Guidelines for VHDL-based Design	CLO5	-Report	-Practice -Class discussion	[1]

9	Programmable Device Technologies and Introduction to the Altera FPGA	CLO5	-Report	-Practice -Class discussion	[1]

4. Assessment plan

Assessment Type

Assessment Type	CLO1	CLO2	CLO3	CLO4	CLO5
Lab. Assignments (70%)	70%	70%	70%	70%	70%
Final examination (30%)	30%	30%	30%	30%	30%

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

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1. When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.↩

Rubrics (optional)

1. Grading checklist

Grading checklist for Written Reports			
Student: ……..	HW/Assignment: …….		
Date: ……	Evaluator: ……		
	Max.	**Score**	**Comments**
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		
Presentation (20%)			

Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)	10		
TOTAL SCORE	100		

2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	**Description**
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	Issue/ problem to be considered critically is stated without clarification or description.

Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation / evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective,	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.

	thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	(perspective, thesis/ hypothesis).		
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequence s and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequence s and implications) are oversimplifie d.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.

	presentation cohesive.			
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities)	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference

	make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022

Dean of School of Computer Science and Engineering

Assoc.Prof. Nguyen Van Sinh

Course Name: Embedded Systems

Course Code: IT115IU

1. General information

Course designation	This course addresses the considerations in designing real-time embedded systems, both from a hardware and software perspective.
Semester(s) in which the course is taught	6
Person responsible for the course	Dr. Nguyen Toan Van
Language	English
Relation to curriculum	Compulsory (CE)
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	Total workload: 135 Contact hours: 45 (lecture) Private study including examination preparation, specified in hours: 90
Credit points	Number of credits: 3 Lecture: 2 Mini project: 1
Required and recommended prerequisites for joining the course	Digital Logic Design Micro-processing Systems
Course objectives	This course addresses the considerations in designing real-time embedded systems, both from a hardware and software perspective. The primary emphasis is on real-time processing for communications and signal processing systems. Programming projects in a high level language like C/C++ will be an essential component of the course, as well as hardware design with modern design tools.
Course learning outcomes	CLO 1. An ability to understand the "big ideas" in embedded systems CLO 2. An ability to obtain direct hands-on experience on both hardware and software elements commonly used in embedded system design. CLO 3. An ability to understand basic real-time resource management theory

<table>
<tr><td></td><td>CLO 4. An ability to understand the basics of embedded system application concepts such as signal processing.
<table>
<tr><th>Competency level</th><th>Course learning outcome (CLO)</th></tr>
<tr><td>Knowledge</td><td>CLO1, 2</td></tr>
<tr><td>Skill</td><td>CLO1, 2</td></tr>
<tr><td>Attitude</td><td>CLO3, 4</td></tr>
</table></td></tr>
<tr><td>Content</td><td>The description of the contents should clearly indicate the weighting of the content and the level.
Weight: lecture session (~~3~~ hours)
Teaching levels: I (Introduce); T (Teach); U (Utilize)
<table>
<tr><th>Topic</th><th>Weight</th><th>Level</th></tr>
<tr><td>Introduction to Embedded systems</td><td>1</td><td>I, T</td></tr>
<tr><td>Hardware/software functional partitioning</td><td>1</td><td>T, U</td></tr>
<tr><td>System architectures</td><td>1</td><td>T, U</td></tr>
<tr><td>Pipelining, interrupt service routines</td><td>1</td><td>T, U</td></tr>
<tr><td>Software structures:</td><td>1</td><td>T, U</td></tr>
<tr><td>Evaluating system performance correctness, speed</td><td>1</td><td>T, U</td></tr>
<tr><td>Continuation of system performance evaluation</td><td>1</td><td>T, U</td></tr>
<tr><td>Profiling system performance</td><td>1</td><td>T, U</td></tr>
<tr><td>Continuation of performance profiling</td><td>1</td><td>T, U</td></tr>
<tr><td>Embedded systems Project (2nd presentation from industry)</td><td>1</td><td>U</td></tr>
<tr><td>Performance optimization</td><td>1</td><td>T, U</td></tr>
<tr><td>Mini Project demo and presenation</td><td>1</td><td>U</td></tr>
</table></td></tr>
<tr><td>Examination forms</td><td>Multiple-choice questions, short-answer questions</td></tr>
<tr><td>Study and examination requirements</td><td>Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.
Assignments/Examination: Students must have more than 50/100 points overall to pass this course.</td></tr>
<tr><td>Reading list</td><td>[1] Amos, B. (2020). Hands-On RTOS with Microcontrollers: Building real-time embedded systems using FreeRTOS, STM32 MCUs, and SEGGER debug tools. Packt Publishing Ltd.</td></tr>
</table>

2. Learning Outcomes Matrix (optional)

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO					
CLO	1	2	3	4	5	6
1		✓				
2		✓				
3						✓
4						✓

3. Planned learning activities and teaching methods

Week	**Topic**	**CLO**	**Assessments**	**Learning activities**	**Resources**
1	Introduction to Embedded systems	CLO1	Homework	- Lecture - Class discussion	[1]
2	Hardware/software functional partitioning	CLO1	Homework	- Lecture - Class discussion	[1]
3	System architectures	CLO1, 2	Homework	- Lecture - Class discussion	[1]
4	Pipelining, interrupt service routines	CLO1, 2	Homework	- Lecture - Class discussion	[1]
5 & 6	Industrial applications of Embedded systems	CLO1, 2	Homework	- Lecture, - Group work	
	Midterm		**Written exam**		
7	Software structures:	CLO3	Homework	- Lecture - Class discussion	[1]
8	Evaluating system performance correctness, speed	CLO3	Homework	- Lecture - Class discussion	[1]
9	Continuation of system performance evaluation	CLO3	Homework	- Lecture - Class discussion	[1]

10	Profiling system performance	CLO3, 4	Homework	- Lecture - Class discussion	[1]
11	Continuation of performance profiling	CLO3, 4	Homework	- Lecture - Class discussion	[1]
12	Performance optimization	CLO4	Homework	- Lecture - Class discussion	[1]
13 & 14	Industrial applications of Embedded systems	CLO3, 4	Homework	- Lecture, - Group work	
15	Mini project demo and Presentation	CLO3, 4	Homework	- Class discussion	
	Final exam		**Written exam**		

4. Assessment plan

Assessment Type

Assessment Type	**CLO1**	**CLO2**	**CLO3**	**CLO4**
Midterm examination (30%)	30%	30%	30%	30%
Final examination (40%)	40%	40%	40%	40%
Exercises/ Quiz (30%)	30%	30%	30%	30%

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

Rubrics (optional)

1. Grading checklist

Grading checklist for Written Reports			
Student: ……..	HW/Assignment:		
Date: ……	…….		
	Evaluator:		
	……		
	Max.	**Score**	**Comments**
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		

Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)	10		
TOTAL SCORE	100		

2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	**Description**
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined,	Issue/ problem to be considered critically is stated without clarification or description.

	full understanding.		ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	
Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation / evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.

Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**

Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.

	polished and confident.	appears comfortable.	appears tentative.	
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022

Dean of School of Computer Science and Engineering

Assoc.Prof. Nguyen Van Sinh

Course Name: Embedded Systems Laboratory

Course Code: IT127IU

1. General information

Course designation	This course integrates microprocessors into digital systems.
Semester(s) in which the course is taught	
Person responsible for the course	Assoc. Prof. Vo Thi Luu Phuong,
Language	English
Relation to curriculum	Compulsory (CE)
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: 60 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 30 (laboratory) Private study including examination preparation, specified in hours: 30
Credit points	Number of credits : 1 Lecture: 0 Laboratory: 1
Required and recommended prerequisites for joining the course	Digital Logic Design Micro-processing Systems
Course objectives	This course integrates microprocessors into digital systems. The course includes hardware interfacing, bus protocols and peripheral systems, embedded and real-time operating systems, real-time constraints, networking, and memory system.
Course learning outcomes	CLO 1. An ability to design complex electronic systems interfacing multiple integrated circuits. CLO 2. An ability to design and conduct experiments, as well as analyze and interpret data. CLO 3. An ability to identify, formulate, and solve engineering problems in designing and implementing embedded systems. CLO 4. An ability to use the techniques, skills, and modern engineering tools necessary for implementing embedded systems.

Competency level	**Course learning outcome (CLO)**
Knowledge	CLO1, 2
Skill	CLO1, 2
Attitude	CLO3, 4

<table>
<tr><td>Content</td><td>The description of the contents should clearly indicate the weighting of the content and the level.
Weight: lecture session (3 hours)
Teaching levels: I (Introduce); T (Teach); U (Utilize)
<table>
<tr><th>Topic</th><th>Weight</th><th>Level</th></tr>
<tr><td>Hardware/software codesign</td><td>1</td><td>T, U</td></tr>
<tr><td>Polled I/O</td><td>1</td><td>T, U</td></tr>
<tr><td>Interrupt-driven I/O</td><td>1</td><td>T, U</td></tr>
<tr><td>Bus Arbitration</td><td>1</td><td>T, U</td></tr>
<tr><td>Bus Saturation</td><td>1</td><td>T, U</td></tr>
<tr><td>Memory system operation and</td><td>1</td><td>T, U</td></tr>
<tr><td>Multitasking on one CPU</td><td>1</td><td>T, U</td></tr>
<tr><td>Multiprocessing</td><td>1</td><td>T, U</td></tr>
<tr><td>Real-time performance</td><td>1</td><td>T, U</td></tr>
</table></td></tr>
<tr><td>Examination forms</td><td>Multiple-choice questions, short-answer questions</td></tr>
<tr><td>Study and examination requirements</td><td>Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.
Assignments/Examination: Students must have more than 50/100 points overall to pass this course.</td></tr>
<tr><td>Reading list</td><td></td></tr>
</table>

2. Learning Outcomes Matrix (optional)

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO					
CLO	1	2	3	4	5	6
1		✓				
2		✓				
3						✓
4						✓

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
1	Hardware/software codesign	CLO1	-Report	-Practice -Class discussion	[1]
2	Polled I/O	CLO1	-Report	-Practice	[1]

				-Class discussion	
3	Interrupt-driven I/O	CLO1, 2	-Report	-Practice -Class discussion	[1]
5	Bus Arbitration	CLO1, 2	-Report	-Practice -Class discussion	[1]
6	Bus Saturation	CLO1, 2	-Report	-Practice -Class discussion	[1]
7	Memory system operation and	CLO3	-Report	-Practice -Class discussion	[1]
8	Multitasking on one CPU	CLO3	-Report	-Practice -Class discussion	[1]
9	Multiprocessing using multiple	CLO3, 4	-Report	-Practice -Class discussion	[1]
10	Real-time performance	CLO3, 4	-Report	-Practice -Class discussion	[1]

4. Assessment plan

Assessment Type

Assessment Type	CLO1	CLO2	CLO3	CLO4
Final examination (30%)	30%	30%	30%	30%
Exercises/ Quiz (70%)	70%	70%	70%	70%

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

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1. When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.↩

Rubrics (optional)

1. Grading checklist

Grading checklist for Written Reports	
Student: ……..	HW/Assignment:
Date: ……	…….

	Evaluator: ……		
	Max.	**Score**	**Comments**
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)	10		
TOTAL SCORE	100		

2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	**Description**
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
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2	Demonstrates little understanding of the problem. Many requirements of task are missing.
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Note: this rubric is also used to evaluate questions in an exam.

3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**

Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	Issue/ problem to be considered critically is stated without clarification or description.
Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation / evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts

	presenting a position.		others' assumptions than one's own (or vice versa).	when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	Milestone		Benchmark
	4	3	2	1
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.

	polished and confident.			
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022

Dean of School of Computer Science and Engineering

Assoc.Prof. Nguyen Van Sinh

Course Name: Concepts in VLSI Design

Course Code: IT110IU

1. General information

Course designation	This subject covers the fundamental knowledge of concepts in VLSI design
Semester(s) in which the course is taught	7
Person responsible for the course	Dr. Nguyễn Toàn Văn
Language	English
Relation to curriculum	Compulsory (CE)
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: 135 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 45 (lecture) Private study including examination preparation, specified in hours: 90
Credit points	Number of credits : 3 Lecture: 3 Laboratory: 0
Required and recommended prerequisites for joining the course	Digital Logic Design Electronics Device
Course objectives	This course introduces the digital VLSI chip design based on CMOS technology and including dynamic clocked logic, analog MOSFET timing analysis, and layout design rules. The course also develops the use of computer-aided design software tools and cell library construction as well as an understanding of elementary circuit testing.
Course learning outcomes	

CLO 1	design logic circuit layouts for both static CMOS and dynamic clocked CMOS circuits
CLO 2	analyze VLSI circuit timing using Logic Effort
CLO 3	describe the sources and effects of clock skew
CLO 4	assemble an entire chip and add the appropriate pads to a layout

Competency level	Course learning outcome (CLO)
Knowledge	CLO1,4
Skill	CLO9
Attitude	CLO6

Content

The description of the contents should clearly indicate the weighting of the content and the level.
Weight: lecture session (~~3~~ hours)
Teaching levels: I (Introduce); T (Teach); U (Utilize)

Content	Weight	Level
Introduction and Overview to Fabrication	1	I
Circuits and Layout	3	I
Microprocessor Example	1	I
CMOS Transistor Theory	3	T,U
DC and Transient Response	3	I
Logical Effort	3	T,U
Power	3	I
Combinational Circuit Design	3	T,U
Circuit Families	3	I
Sequential Circuit Design	3	T,U
Adders	1	I
Design for Testability	3	T,U

Examination forms

Multiple-choice questions, short-answer questions

Study and examination requirements

Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.
Assignments/Examination: Students must have more than 50/100 points overall to pass this course.

Reading list

1. Neil W este and David Harris, CMOS VLSI Design: A Circuits and Systems Perspective, 4th edition, Pearson, 2010
2. Sung-Mo Kang and Yusuf Leblebici, CMOS Digital Integrated Circuits, 3rd edition, McGraw-Hill, 2002
3. Jan M. Rabaey, Anantha Chandrakasan and Borivoje Nikolic, Digital Integrated Circuits, 2nd edition, Prentice Hall, 2002
4. David A. Patterson and John L. Hennessy, Computer Organization and Design, 5th edition, Morgan Kaufmann, 2014
5. Michael L. Bushnell and Vishwani D. Agrawal, Essentials of Electronic Testing for Digital, Memory and Mixed-

	Signal VLSI Circuits, 2nd edition, Kluwer Academic Publishers, 2002

2. Learning Outcomes Matrix (optional)

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO					
CLO	1	2	3	4	5	6
1	X	X				
2	X	X				
3			X			
4	X	X	X			X

3. Planned learning activities and teaching methods

Week	Content	CLOs	Teaching and Learning Activities		Assessment Activities	Resources
			Lecturer	Student		
1	Introduction and Overview to Fabrication	CLO 1	• Lecture	• Class discussion		[1,2,3,4,5]
2	Circuits and Layout	CLO 1	• Lecture	• Class discussion	Quiz1	[1,2,3,4,5]
3	Microprocessor Example	CLO 1	• Lecture	• Class discussion	Homework	[1,2,3,4,5]
4	CMOS Transistor Theory	CLO 1	• Lecture	• Class discussion	Homework	[1,2,3,4,5]
5	DC and Transient Response	CLO 2	• Lecture	• Class discussion	Homework	[1,2,3,4,5]
6	Logical Effort	CLO 2	• Lecture	• Class discussion	Quiz2	[1,2,3,4,5]
7	Power	CLO 2	• Lecture	• Class discussion	Homework	[1,2,3,4,5]
Midterm examination		CLO 1		Written exam	Quiz3	[1,2,3,4,5]
8&9	Combinational Circuit Design	CLO 2	• Lecture	• Class discussion	Homework	

10&11	Circuit Families	CLO 2,3	• Lecture	• Class discussion	Homework	[1,2,3,4,5]
12	Sequential Circuit Design	CLO 3	• Lecture	• Class discussion	Quiz4	[1,2,3,4,5]
13	Adders	CLO 4	• Lecture	• Class discussion	Homework	[1,2,3,4,5]
14&15	Design for Testability	CLO 4	• Lecture	• Class discussion	Homework	[1,2,3,4,5]
Final Project		CLO 1,2,3,4	Group Project			[1,2,3,4,5]
Final examination		CLO 1,2,3,4		Written exam		

4. Assessment plan

Assessment Type	**CLO1**	**CLO2**	**CLO3**	**CLO4**
Midterm examination (30%)	30%	30%	30%	30%
Final examination (40%)	40%	40%	40%	40%
Exercises/ Quiz (30%)	30%	30%	30%	30%

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

Rubrics (optional)

1. Grading checklist

Grading checklist for Written Reports			
Student: …….. Date: ……	HW/Assignment: ……. Evaluator: ……		
	Max.	**Score**	**Comments**
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		

Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)	10		
TOTAL SCORE	100		

2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	**Description**
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermine	Issue/ problem to be considered critically is stated without clarification or description.

			d, and/ or backgrounds unknown.	
Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation / evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into	Specific position (perspective, thesis/hypothesis) takes into account the complexities of	Specific position (perspective, thesis/ hypothesis) acknowledges different	Specific position (perspective, thesis/ hypothesis) is stated, but is

	account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	sides of an issue.	simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequence s and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequence s and implications) are oversimplifie d.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable

	consistently observable and is skillful and makes the content of the presentation cohesive.	consistently observable within the presentation.	observable within the presentation.	within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities)

	authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022

Dean of School of Computer Science and Engineering

Assoc.Prof. Nguyen Van Sinh

Course Name: Concepts in VLSI Design Laboratory

Course Code: IT126IU

1. General information

Course designation	This laboratory provides an introduction to digital VLSI chip design based on the use of VLSI design tools to design a MIPS microprocessor chip.
Semester(s) in which the course is taught	7
Person responsible for the course	Dr. Nguyễn Toàn Văn
Language	English
Relation to curriculum	Compulsory
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: 60 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 30 (laboratory) Private study including examination preparation, specified in hours: 30
Credit points	Number of credits : 1 Lecture: 0 Laboratory: 1
Required and recommended prerequisites for joining the course	Digital Logic Design Electronics Devices
Course objectives	This laboratory provides an introduction to digital VLSI chip design based on the use of VLSI design tools to design a MIPS microprocessor chip. The laboratory employs a learning-by-doing approach, emphasizing hands-on practical design experiences and computer simulations.
Course learning outcomes	

CLO1	use the Electric VLSI design tool to build an 8-bit MIPS microprocessor including schematic entry, layout, transistor-level cell design, gate-level logic design, hierarchical design
CLO2	use the Electric VLSI design tool to build an 8-bit MIPS microprocessor including switch-level simulation (IRSIM and ModelSim), Design Rule Checking (DRC), Electrical Rule Checking (ERC),

	Network Consistency Checking (NCC), HDL design (Verilog), pad frame generation and routing, pre-tape-out verification
CLO4	design functional units such as adders, multipliers, and PLAs
CLO5	describe and avoid common CMOS circuit pitfalls

Competency level	Course learning outcome (CLO)
Knowledge	CLO1,2
Skill	CLO4
Attitude	CLO5

Content

The description of the contents should clearly indicate the weighting of the content and the level.
Weight: lecture session (~~3~~ hours)
Teaching levels: I (Introduce); T (Teach); U (Utilize)

Topic	Weight	Level
Schematic Entry and Switch-Level Simulation	1	I
Building a Standard Cell Library	1	T,U
MIPS Processor HDL Simulation	1	T,U
Datapath Design	2	T,U
Design of ALU Decoder Control Logic	1	T,U
Controller Synthesis	1	T,U
MIPS Processor Layout	1	T,U
Pad Frame Assembly	1	I

Examination forms

Multiple-choice questions, short-answer questions

Study and examination requirements

Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.
Assignments/Examination: Students must have more than 50/100 points overall to pass this course.

Reading list

1. David A. Patterson and John L. Hennessy, Computer Organization and Design 5th, 2013
2. N. H. E. Weste and D. M. Harris, CMOS VLSI Design 3rd, 2005

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO

CLO	1	2	3	4	5	6
1	X	X				
2	X	X				
4		X	X			X
5			X			

3. Planned learning activities and teaching methods

Week	Content	CLOs (Gx.x)	Teaching and Learning Activities	Assessment	Resources
1	Schematic Entry and Switch-Level Simulation	CLO 1	• Lecture • Class discussion • Pratice	Report	[1,2]
2	Building a Standard Cell Library	CLO 1	• Lecture • Class discussion • Pratice	Report	[1,2]
3	MIPS Processor HDL Simulation	CLO 1,2	• Lecture • Class discussion • Pratice	Report	[1,2]
4	Datapath Design	CLO 1,2	• Lecture • Class discussion • Pratice	Report	[1,2]
5	Design of ALU Decoder Control Logic	CLO 3	• Lecture • Class discussion • Pratice	Report	[1,2]
6	Controller Synthesis	CLO 3	• Lecture • Class discussion • Pratice	Report	[1,2]
7	MIPS Processor Layout and Pad Frame Assembly	CLO 3	• Lecture • Class discussion • Pratice	Report	[1,2]
Final Project		CLO 4,5	Group Project Design report	Report	[1,2]
Final examination		CLO 1,2,3,4	Written exam		

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4	CLO5
Lab. Assignments (70%)	70%	70%	70%	70%	70%
Final examination (30%)	30%	30%	30%	30%	30%

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

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1. When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.↩

Rubrics (optional)

1. Grading checklist

Grading checklist for Written Reports			
Student: …….. Date: ……	HW/Assignment: ……. Evaluator: ……		
	Max.	**Score**	**Comments**
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)	10		
TOTAL SCORE	100		

2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	**Description**

5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	Issue/ problem to be considered critically is stated without clarification or description.
Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are	Information is taken from source(s) with some interpretation / evaluation, but not enough to develop a coherent analysis or synthesis.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.

	questioned thoroughly.	subject to questioning.	Viewpoints of experts are taken as mostly fact, with little questioning.	
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.

Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the	Language choices are thoughtful and generally support the effectiveness of the presentation.	Language choices are mundane and commonplace and partially support the effectiveness of the	Language choices are unclear and minimally support the effectiveness of the presentation. Language in

	effectiveness of the presentation. Language in presentation is appropriate to audience.	Language in presentation is appropriate to audience.	presentation. Language in presentation is appropriate to audience.	presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.

Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022

Dean of School of Computer Science and Engineering

Assoc.Prof. Nguyen Van Sinh

Course Name: Digital Signal Processing

Course Code: IT103IU

1. General information

Course designation	This subject covers the fundamental knowledge of digital signal processing
Semester(s) in which the course is taught	
Person responsible for the course	Assoc. Prof. Dinh Duc Anh Vu
Language	English
Relation to curriculum	Compulsory (CE)
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: 195 Contact hours: 45 (lecture) + 30(laboratory). Private study including examination preparation, specified in hours: 120
Credit points	Number of credits: 4 Lecture: 3 Laboratory: 1
Required and recommended prerequisites for joining the course	
Course objectives	This course is an introduction to the basic principles, methods, and applications of digital signal processing, emphasizing its algorithmic, computational, and programming aspects. In particular, the students will learn the conversion from analog to digital, the concepts of discrete time linear systems, filtering, spectral analysis of discrete time signals and filter design.
Course learning outcomes	

CLO 1	Know the analysis of discrete time signals, demonstrate understanding of FIR filter design
CLO 2	Understand the theory behind interpolators, decimators, and sampling rate converters
CLO 3	Study the modern digital signal processing algorithms and applications.
CLO 4	Apply the algorithms for wide area of recent applications such as image processing, wireless communication, biomedical engineering, speech processing, video processing, etc., which are appropriate for external, societal and environmental applications

Competency level	Course learning outcome (CLO)
Knowledge	CLO1,2
Skill	CLO4
Attitude	CLO3

Content

The description of the contents should clearly indicate the weighting of the content and the level.
Weight: lecture session (~~3~~ hours)
Teaching levels: I (Introduce); T (Teach); U (Utilize)

Content	Weight	Level
Introduction to sampling and reconstruction	1	I
Quantization	1	T
Discrete-time systems	2	T,U
FIR filtering and convolution	1	T
Z - transform	2	T,U
Transfer function	1	T
Digital filter realization	1	T
DFT/FFT algorithms	2	T,U
Signal processing applications	2	T
Filter design techniques	3	T

Examination forms

Multiple-choice questions, short-answer questions

Study and examination requirements

Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.
Assignments/Examination: Students must have more than 50/100 points overall to pass this course.

Reading list

1. S. J. Orfanidis, Introduction to Signal Processing 2nd, 1996

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO					
CLO	1	2	3	4	5	6
1	X					
2	X	X				

3	X	X				
4		X	X			X

3. Planned learning activities and teaching methods

Week	Content	CLO	Teaching and Learning Activities	Assessment	Resources
1	Introduction to sampling and reconstruction Introduction of signal	CLO 2	• Lecture • Class discussion	Homework	[1]
2	Quantization Linear Time Invariant System Properties	CLO 3	• Lecture • Class discussion	Homework	[1]
3	Discrete-time systems Discrete time and Continuous time Convolution methods	CLO 3	• Lecture • Class discussion	Quiz 1	[1]
4&5	FIR filtering and convolution	CLO 1	• Lecture • Class discussion	Homework	[1]
6&7	Fourier Series and Fourier Transforms Z - transform	CLO 3	• Lecture • Class discussion	Homework, Quiz 2	[1]
8	Transfer function	CLO 3	• Lecture • Class discussion	Homework	[1]
Midterm examination		CLO 1, CLO 2, CLO 3	-Written exam		
9&10	Digital filter realization	CLO 3, CLO 4	• Lecture • Class discussion	Homework	[1]

11&12	DFT/FFT algorithms	CLO 3	• Lecture • Class discussion	Quiz 3	[1]
13&14	Signal processing applications	CLO 4	• Lecture • Class discussion • Class project	Homework	[1]
15	Filter design techniques	CLO 4	• Lecture • Class discussion	Homework	[1]
Final examination		CLO 1, CLO 2, CLO 3, CLO 4	-Written exam		

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
Midterm examination (30%)	30%	30%	30%	30%
Final examination (40%)	40%	40%	40%	40%
Exercises/ Quiz (10%)	10%	10%	10%	10%
Labs (20%)	20%	20%	20%	20%

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

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1. When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.↩

Rubrics (optional)

1. Grading checklist

Grading checklist for Written Reports			
Student: …….. Date: ……	HW/Assignment: ……. Evaluator: ……		
	Max.	**Score**	**Comments**
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)	10		
TOTAL SCORE	100		

2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	**Description**
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**

Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	Issue/ problem to be considered critically is stated without clarification or description.
Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation / evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts

	presenting a position.		others' assumptions than one's own (or vice versa).	when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	Milestone		Benchmark
	4	3	2	1
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.

	polished and confident.			
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022

Dean of School of Computer Science and Engineering

Assoc.Prof. Nguyen Van Sinh

Course Name: Computer Graphics

Course Code: IT024IU

1. General information

Course designation	This subject introduces the students to principles and algorithms of computer graphics and requirements of creating graphical applications.
Semester(s) in which the course is taught	
Person responsible for the course	Assoc.Prof. Nguyen Van Sinh
Language	English
Relation to curriculum	Elective course (CS)
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	Total workload: 195 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 45 (lecture) + 30 (laboratory) Private study including examination preparation, specified in hours: 120
Credit points	Number of credits: 4 Lecture: 3 Laboratory: 1
Required and recommended prerequisites for joining the course	Object-Oriented Programming
Course objectives	This course provides students the fundamentals of computer graphics concepts, methodologies, and processes. It develop an understanding of the algorithms and fundamental techniques for generating and modifying pictures/objects with a digital computer, including the handling of color, and the generation of visible-surface projections of three dimensional scenes, for applications in science, engineering, and the entertainment world (i.e. connect to the VR & AR application; Games industry and Images processing).
Course learning outcomes	CLO 1. Understand and apply the algorithms and fundamental techniques for generating and modifying pictures, 2D/3D objects with a digital computer. CLO 2. Understand and apply the handling of color, and the generation of visible-surface projections of 3D scenes, for applications in science, engineering and the entertainment world.

<table>
<tr><td></td><td>CLO 3. Apply knowledge of mathematics and ability in graphical programming to develop games, construct and reconstruct 2D/3D objects, process images, VR & AR, etc.
CLO 4. Work in a team to ready build a computer graphics application
<table>
<tr><th>Competency level</th><th>Course learning outcome (CLO)</th></tr>
<tr><td>Knowledge</td><td>CLO1</td></tr>
<tr><td>Skill</td><td>CLO2, CLO3</td></tr>
<tr><td>Attitude</td><td>CLO4</td></tr>
</table></td></tr>
<tr><td>Content</td><td>The description of the contents should clearly indicate the weighting of the content and the level.
Weight: lecture session (3 teaching hours)
Teaching levels: I (Introduce); T (Teach); U (Utilize)
<table>
<tr><th>Topic</th><th>Weight</th><th>Level</th></tr>
<tr><td>Week 1: Introduction to Computer Graphics, Mathematics Foundation</td><td>3</td><td>I,T</td></tr>
<tr><td>Week 2: Bessenham algorithms</td><td>3</td><td>I,T,U</td></tr>
<tr><td>Week 3: Line clipping</td><td>3</td><td>I,T,U</td></tr>
<tr><td>Week 4: Polygon clipping</td><td>3</td><td>I,T,U</td></tr>
<tr><td>Week 5: Transformation and Perspective</td><td>3</td><td>I,T</td></tr>
<tr><td>Week 6: Transformation (cont.)</td><td>3</td><td>I,T,U</td></tr>
<tr><td>Week 7: Introduction to OpenGL programing</td><td>3</td><td>I,T,U</td></tr>
<tr><td>Week 8: View Transformation + Midterm</td><td>3</td><td>I,T,U</td></tr>
<tr><td>Week 9: 3D clipping</td><td>3</td><td>I,T,U</td></tr>
<tr><td>Week 10: Visual Surface Determination</td><td>3</td><td>I,T,U</td></tr>
<tr><td>Week 11: Color Models</td><td>3</td><td>I,T,U</td></tr>
<tr><td>Week 12: Image Rendering and Generation</td><td>3</td><td>I,T,U</td></tr>
<tr><td>Week 13: Ray Tracing & Texture Mapping</td><td>3</td><td>I,T,U</td></tr>
<tr><td>Week 14: Bezier Curve and Surface processing</td><td>3</td><td>I,T,U</td></tr>
<tr><td>Week 15: Building graphics application; final review</td><td>3</td><td>I,T,U</td></tr>
</table></td></tr>
<tr><td>Examination forms</td><td>Multiple-choice questions, short-answer questions (computing and programing)</td></tr>
<tr><td>Study and examination requirements</td><td>Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.
Assignments/Examination: Students must have more than 50/100 points overall to pass this course.</td></tr>
</table>

Reading list	1. Steve Marschner and Peter Shirley, Fundamentals of Computer Graphics 5th, by A K Peters/CRC Press ISBN: 9780367505035, 2021. 2. Frank Klawonn , Introduction to Computer Graphics Using Java 2D and 3D, 2nd Edition, Springer 2012. 3. Sumanta Guha, Computer Graphics Through OpenGL From Theory to Experiments Third Edition (AIT), CRC Press, 2019. 4. John Vince, Mathematics for Computer Graphics, 5th Edition, Springer 2017.

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO					
CLO	1	2	3	4	5	6
1	X	X				
2	X	X				
3		X				X
4					X	

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
1	Introduction to Computer Graphics, Mathematics Foundation	1	Quiz	Lecture,	[1, 4]
2	Bessenham algorithms	1, 2	Quiz, Lab, Midterm exam	Lecture, Discussion, In-class exercises	[1, 2, 3]
3	Line clipping	1, 2	Quiz, Lab, Midterm exam	Lecture, Discussion, In-class exercises	[1, 2, 3]
4	Polygon clipping	1, 2	Quiz, Lab, Midterm exam	Lecture, Discussion, In-class exercises	[1, 2, 3]
5	Transformation and Perspective	2, 3	Quiz, Lab, Midterm exam	Lecture, Discussion, In-class exercises	[1, 2, 3]

6	Transformation (cont.)	2, 3	Quiz, Lab, Midterm exam	Lecture, Discussion, In-class exercises	[1, 2, 3]
7	Introduction to OpenGL	2,3,4	Quiz, Lab, Midterm exam	Lecture, Discussion, In-class exercises	[1, 2, 3]
8	**Midterm**				
9	View Transformation	2, 3	Quiz, Lab, Final exam	Lecture, Discussion, In-class exercises	[1, 2, 3]
10	3D clipping	2, 3	Quiz, Lab, Final exam	Lecture, Discussion, In-class exercises	[1, 2, 3]
11	Visual Surface Determination	2, 3	Quiz, Lab, Final exam	Lecture, Discussion, In-class exercises	[1, 2, 3]
12	Color Models	2, 3	Quiz, Lab, Final exam	Lecture, Discussion, In-class exercises	[1, 2, 3]
13	Image Rendering and Generation	2,3,4	Quiz, Lab, Final exam	Lecture, Discussion, In-class exercises	[1, 2, 3]
14	Ray Tracing & Texture Mapping	2,3,4	Quiz, Lab, Final exam	Lecture, Discussion, In-class exercises	[1, 2, 3]
15	Bezier Curve and Surface processing	2,3,4	Quiz, Lab, Final exam	Lecture, Discussion, In-class exercises	[1, 2, 3]
16	Building graphics application; final review	2,3,4	Quiz, Lab, Final exam	Lecture, Discussion, Homework	[1, 2, 3]
17	**Final exam**				

4. Assessment plan

Assessment Type	**CLO1**	**CLO2**	**CLO3**	**CLO4**
Labs (20%)		30%	30%	40%

Midterm examination (30%)	40%	60%		
Final examination (40%)		50%	50%	
Exercises/ Quiz (10%)	30%	40%	30%	

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics (optional)

5.1. Grading checklist

Grading checklist for Written Reports			
Student: …….. Date: ……	HW/Assignment: ……. Evaluator: ……		
	Max.	**Score**	**Comments**
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)	10		
TOTAL SCORE	100		

5.2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	**Description**
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	Issue/ problem to be considered critically is stated without clarification or description.
Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation / evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others'	Identifies own and others' assumptions and several relevant contexts when	Questions some assumptions. Identifies several relevant	Shows an emerging awareness of present assumptions (sometimes

	assumptions and carefully evaluates the relevance of contexts when presenting a position.	presenting a position.	contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

	discussed in priority order.		implications) are identified clearly.	

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and	Delivery techniques (posture, gesture, eye contact, and	Delivery techniques (posture, gesture, eye contact, and	Delivery techniques (posture, gesture, eye contact, and vocal

	vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	vocal expressiveness) make the presentation understandable, and speaker appears tentative.	expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022

Dean of School of Computer Science and Engineering

Assoc.Prof. Nguyen Van Sinh

Course Name: Deep Learning

Course Code: IT157IU

1. General information

Course designation	This course helps students understand the capabilities, challenges, and consequences of deep learning and prepare students to participate in the development of leading-edge AI technology
Semester(s) in which the course is taught	
Person responsible for the course	Dr. Mai Hoang Bao An
Language	English
Relation to curriculum	Elective (CS, DS)
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	Total workload: 195 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 45 (lecture) + 30 (laboratory) Private study including examination preparation, specified in hours: 120
Credit points	Number of credits: 4 Lecture: 3 Laboratory: 1
Required and recommended prerequisites for joining the course	none
Course objectives	This course helps students understand the capabilities, challenges, and consequences of deep learning and prepare students to participate in the development of leading-edge AI technology. In this course, students will build and train neural network architectures such as Convolutional Neural Networks, Recurrent Neural Networks, Transformers, and learn how to make them better with strategies such as Dropout, BatchNorm, and more. Get ready to master theoretical concepts and their industry applications using Python and PyTorch and tackle real-world cases.
Course learning outcomes	CLO 1. Understand fundamental concepts of Deep Learning. Get familiar with some popular algorithms used in deep learning models. Understand and be able to use of popular libraries such as NumPy, PyTorch. CLO 2. Neural Networks for regression and classification. The concept of Multilayer Perceptrons. The essential networks:

Convolutional Neural Networks (CNN), Recurrent Neural Networks (RNN).
CLO 3. Build, train, and deploy different types of Deep Architectures from traditional to modern Architectures.
CLO 4. Understand and be able to apply deep learning techniques to real-world scenarios: Computer Vision, Natural Language Processing.

Competency level	**Course learning outcome (CLO)**
Knowledge	CLO 1, CLO 2, CLO 3, CLO 4
Skill	CLO 3, CLO 4
Attitude	CLO 3, CLO 4

Content

The description of the contents should clearly indicate the weighting of the content and the level.
Weight: lecture session (~~3~~ hours)
Teaching levels: I (Introduce); T (Teach); U (Utilize)

Topic	**Weight**	**Level**
Introduction to Deep Learning Some demos on the applications of Deep Learning	1	I, U
Linear Classifiers, Optimization and Gradient Descent Backpropagation Algorithm Introduction to PyTorch library	1	I, T
Linear Neural Networks for Regression Linear Neural Networks for Classification	1	T, U
Multilayer Perceptrons	1	T, U
Advances in PyTorch library	1	T, U
Convolutional Neural Networks (CNN)	1	T, U
Recurrent Neural Networks (RNN)	1	T, U
Modern CNN: • Networks Using Blocks (VGG) • Multi-Branch Networks (GoogLeNet) • Residual Neural Network (Resnet) • MobileNet	2	T, U
Modern RNN: • Gated Recurrent Units (GRU) • Long Short-Term Memory (LSTM) • Bidirectional RNN • Encoder-Decoder Architecture	2	T, U
Optimization Algorithms used in Deep Learning	1	I, T

	Generative Adversarial Network (GAN) & Deep Convolution GAN	1	T, U
	Deep Learning in Computer Vision	1	T, U
	Deep Learning in Natural Language Processing	1	T, U
Examination forms	Short-answer questions, Long-answer questions, programming questions		
Study and examination requirements	Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. Assignments/Examination: Students must have more than 50/100 points overall to pass this course.		
Reading list	[1] Ian Goodfellow, Yoshua Bengio and Aaron Courville, Deep Learning, The MIT Press 2021, ISBN: 978-0262035613. [2] Aston Zhang, Zachary C. Lipton, Mu Li, and Alexander J. Smola., Dive Into Deep Learning.		

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	1	2	3	4	5	6
1	x					
2		x	x			
3			x	x		x
4				x		x

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
1	Introduction to Deep Learning Some demos on the applications of Deep Learning	1		Lecture, Discussion	[1, 2] Chapter 1
2	Linear Classifiers, Optimization and Gradient Descent Backpropagation Algorithm	1	Exercises	Lecture, In-class exercises	[1, 2] Chapter 2

	Introduction to PyTorch library				
3	Linear Neural Networks for Regression Linear Neural Networks for Classification	1, 2	Exercises	Lecture, In-class exercises	[2] Chapter 3, 4
4	Multilayer Perceptrons	2	Exercises	Lecture, In-class exercises	[2] Chapter 5
5	Advances in PyTorch library	1, 2	Exercises	Lecture, In-class exercises	[2] Chapter 6
6	Convolutional Neural Networks (CNN)	2	Exercises	Lecture, In-class exercises	[2] Chapter 7
7	Recurrent Neural Networks (RNN)	2	Quiz	Lecture, In-class quiz	[2] Chapter 9
8-9	Modern CNN: • Networks Using Blocks (VGG) • Multi-Branch Networks (GoogLeNet) • Residual Neural Network (Resnet) • MobileNet	2, 3	Exercises	Lecture, In-class exercises	[2] Chapter 8
10	**Midterm**				
11-12	Modern RNN: • Gated Recurrent Units (GRU) • Long Short-Term Memory (LSTM) • Bidirectional RNN • Encoder-Decoder Architecture	2, 3	Exercises	Lecture, In-class exercises	[2] Chapter 10
13	Optimization Algorithms used in Deep Learning	1, 4	Seminar	Lecture, Discussion	[2] Chapter 12
14	Generative Adversarial Network (GAN) & Deep Convolution GAN	3, 4	Seminar	Lecture, Discussion	[2] Chapter 18
15	Deep Learning in Computer Vision	4	Seminar	Lecture, Student presentaion	[2] Chapter 14

16	Deep Learning in Natural Language Processing	4	Seminar	Lecture, Student presentaion	[2] Chapter 15
17	**Final exam**				

4. Assessment plan

Assessment Type	**CLO1**	**CLO2**	**CLO3**	**CLO4**
Quiz (5%)	10%		20%	20%
Labs (10%)	30%	30%		
Midterm examination (30%)	50%	40%		
Projects/Presentations/ Report (15%)	10%		30%	30%
Final examination (40%)		30%	50%	50%

5. Rubrics (optional)

5.1. Grading checklist

Grading checklist for Written Reports			
Student: …….. Date: ……	HW/Assignment: ……. Evaluator: ……		
	Max.	**Score**	**Comments**
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)	10		
TOTAL SCORE	100		

5.2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	**Description**

5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	Issue/ problem to be considered critically is stated without clarification or description.
Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation / evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.

			taken as mostly fact, with little questioning.	
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.

Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the	Language choices are thoughtful and generally support the effectiveness of the presentation.	Language choices are mundane and commonplace and partially support the effectiveness of the	Language choices are unclear and minimally support the effectiveness of the presentation. Language in

	effectiveness of the presentation. Language in presentation is appropriate to audience.	Language in presentation is appropriate to audience.	presentation. Language in presentation is appropriate to audience.	presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.

Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022

Dean of School of Computer Science and Engineering

Assoc.Prof. Nguyen Van Sinh

Course Name: Security Technology and Implementation
Course Code: IT165IU

1. General information

Course designation	The course will concentrate on security technologies that can be employed to safeguard and maintain a network. The course will also cover risk management, business continuity and recovery planning, operations security, access control systems, and software development security.
Semester(s) in which the course is taught	
Person responsible for the course	Dr. Le Hai Duong
Language	English
Relation to curriculum	Compulsory
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	Total workload: 195 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 45 (lecture) + 30 (laboratory) Private study including examination preparation, specified in hours: 120
Credit points	Number of credits: 4 Lecture: 3 Laboratory: 1
Required and recommended prerequisites for joining the course	Computer Networks
Course objectives	This course introduces students to information security principles, cryptography systems (symmetric and public key encryptions), risk management, security architecture and design, business continuity operations security, access control systems, protecting TCP/IP network, firewalls, virtual private network, IPSec, software development security.
Course learning outcomes	CLO 1. Gain understanding of information security and the cryptography concepts including symmetric key encryption, hash function, message authentication code, public key encryption, digital signature and digital envelope;

CLO 2. Apply the concepts of authentication and authorization in implementing secure systems and networks;
CLO 3. Analyze and evaluate security risk and security design;
CLO 4. Understand and apply software development security;
CLO 5. Apply security technologies in operations.

Competency level	**Course learning outcome (CLO)**
Knowledge	CLO1, CLO2, CLO4, CLO5
Skill	CLO2, CLO3, CLO4, CLO6
Attitude	

Content

The description of the contents should clearly indicate the weighting of the content and the level.
Weight: lecture session (~~3~~ hours)
Teaching levels: I (Introduce); T (Teach); U (Utilize)

Topic	**Weight**	**Level**
Information security principles	1	T
Governance and risk management;	1	T,U
Security architecture and design;	1	T
Business continuity and disaster recovery planning;	1	T,U
Operation security;	2	T,U
Access control systems and methodology;	1	T
Cryptography;	2	T,U
Overview network and telecommunications security;	1	T,U
Basic security infrastructures and routers;	1	T
Firewalls	1	T,U
Intrusion detection systems and intrusion protection systems	1	T
Virtual private network and IPSec;	1	T
Software Development security.	1	T,U

Examination forms

Multiple-choice questions, short-answer questions

Study and examination requirements

Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.
Assignments/Examination: Students must have more than 50/100 points overall to pass this course.

Reading list	2. William Stallings and Lawrence Brown, Computer Security - Principles and Practice 4th edition, 2018 3. Mark S. Merkow and Jim Breithaupt, Information Security: Principles and Practices, 2nd edition, 2014.

2. **Learning Outcomes Matrix**

The relationship between Course Learning Outcomes (CLO) (1-6) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO					
CLO	1	2	3	4	5	6
1	X		X	X		
2		X				
3	X					
4	X					
5	X					
6	X					

3. **Planned learning activities and teaching methods**

Week	**Topic**	**CLO**	**Assessments**	**Learning activities**	**Resources**
1	Information security principles	1	Quiz, Exam	Lecture, Exercises, Lab	[1,2]
2	Governance and risk management;	3	Quiz, Exam	Lecture, Lab	[2]
3	Security architecture and design;	3	Quiz, Exam	Lecture, Lab	[2]
4	Business continuity and disaster recovery planning;	3	Quiz, Exam	Lecture, Lab	[2]
5,6	Operation security;	5	Quiz, Exam	Lecture, Lab	[2]
7	Access control systems and methodology;	2		Lecture, Lab	
	Midterm exam				
8, 9	Cryptography;	1	Quiz, Exam	Lecture	[1]
10	Overview network and telecommunications;	5	Quiz, Exam	Lecture, Lab	[2]
11	Basic security infrastructures and routers;	5	Quiz, Exam	Lecture, Lab	[2]

12	Firewalls	5	Quiz, Exam	Lecture, Exercises,	[1,2]
13	Intrusion detection systems and intrusion protection systems	5	Quiz, Exam	Lecture, Exercises,	[1,2]
14	Virtual private network and IPSec;	5	Quiz, Exam	Lecture, Lab	[1,2]
15	Software Development security.	4	Quiz, Exam	Lecture	[2]
	Final exam				

4. **Assessment plan**

Assessment Type	**CLO1**	**CLO2**	**CLO3**	**CLO4**	**CLO5**
Midterm examination (30%)	30%	80%	55%		10%
Final examination (40%)	40%			75%	60%
Exercises/ Quiz (30%)	30%	20%	45%	25%	30%

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

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2. When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.↩

5. **Rubrics (optional)**

5.4. Grading checklist

Grading checklist for Written Reports			
Student: …….. Date: ……	HW/Assignment: ……. Evaluator: ……		
	Max.	**Score**	**Comments**
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		

Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)	10		
TOTAL SCORE	100		

5.5. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	**Description**
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.6. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries	Issue/ problem to be considered critically is stated without clarification or description.

			undetermined, and/ or backgrounds unknown.	
Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation/ evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged.	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.

	Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	within position (perspective, thesis/ hypothesis).		
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.

Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/

	presenter's credibility/ authority on the topic.	authority on the topic.	authority on the topic.	authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022

Dean of School of Computer Science and Engineering

Assoc.Prof. Nguyen Van Sinh

Course Name: Software Quality Verification and Validation
Course Code: IT166IU

1. General information

Course designation	
Semester(s) in which the course is taught	
Person responsible for the course	Tran Thanh Tung, Dr.
Language	English
Relation to curriculum	Elective
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: Contact hours (please specify whether lecture, exercise, laboratory session, etc.): Private study including examination preparation, specified in hours: Student responsibility: Students are expected to spend at least 8 hours per week for self – studying. This time should be made up of reading, working on exercises and problems and group assignment.
Credit points	Number of credits : 4 Lecture: 3 Laboratory: 1
Required and recommended prerequisites for joining the course	Object-Oriented Programming
Course objectives	Introduction to software verification, validation, and testing. Strategies and techniques are presented for testing software, and also for planning software testing.
Course learning outcomes	CLO 1. Describe and explain how testing activities involve within software development process. CLO 2. Understand and apply best practices for software testing. CLO 3. Create test cases based on system requirement

Competency level	**Course learning outcome (CLO)**

	Knowledge: CLO1, CLO2 Skill: CLO2, CLO3 Attitude: CLO2
Content	*The description of the contents should clearly indicate the weighting of the content and the level.* Weight: lecture session (~~3~~ hours) Teaching levels: I (Introduce); T (Teach); U (Utilize)

Topic	**Weight**	**Level**
Software Testing Overview	3	I
Software Testing Foundations	3	T
Software Testing Activities	3	T
Model-Driven Test Design	3	T, U
Test Automation	3	T, U
Testing First Approach	3	T
Criteria-Based Test Design	3	T
Input Space Partitioning	3	T
Graph Coverage	3	T
Logic Coverage	3	T
Writing Test Plans	3	T, U
Test implementation	3	T, U

Examination forms	Short-answer questions
Study and examination requirements	Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be

	assessed on the basis of their class participation. Questions and comments are strongly encouraged. Assignments/Examination: Students must have more than 50/100 points overall to pass this course.
Reading list	1. Paul Ammann, Jeff Offutt; Introduction to Software Testing, 2nd, 2017 2. James A. Whittaker; Exploratory Software Testing, 2009. 3. Glendford J. Myers, Tom Badgett, Corey Sandler; The art of Software Testing, 2012.

2. Learning Outcomes Matrix (optional)

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO					
CLO	1	2	3	4	5	6
1	XX					
2		XXX				
3						X

3. Planned learning activities and teaching methods

Week	**Topic**	**CLO**	**Assessments**	**Learning activities**	**Resources**
1	Software Testing Overview	1	Quiz	Lecture	
2	Software Testing Foundations	1	Lab, Quiz, Midterm	Lecture, Discussion, In class exercises	[1,3]
3	Software Testing Activities	2	Quiz	Lecture, Discussion	[2]
4	Model-Driven Test Design	1,2	Lab, Quiz, Midterm	Lecture, Discussion, In class exercises	[1,3]

5	Test Automation	2,3	Lab, Quiz, Midterm	Lecture, Discussion, In class exercises	[1,3]
6	Test Automation – Tools	1,2	Lab, Quiz, Midterm	Lecture, Discussion, In class exercises	[1,3]
7	Testing First Approach	2,3	Lab, Quiz, Midterm	Lecture, Discussion	
8	Criteria-Based Test Design	2,3	Lab, Quiz, Midterm	Lecture, Discussion, In class exercises	[1,3]
9	**Midterm**				
10	Input Space Partitioning – Part 1	1,2	Lab, Quiz, Final	Lecture, Discussion, In class exercises	[1,3]
11	Input Space Partitioning – Part 2	2,3	Lab, Quiz, Final	Lecture, Discussion	[1,2,3]
12	Graph Coverage	1,2	Lab, Quiz, Final	Lecture, Discussion, In class exercises	[1,3]
13	Logic Coverage	2,3	Lab, Quiz, Final	Lecture, Discussion	[1,3]
14	Writing Test Plans	1,2	Lab, Quiz, Final	Lecture, Discussion, In class exercises	[2,3]
15	Test implementation	2,3	Lab, Quiz, Final	Lecture, Discussion	[2,3]
16	**Final exam**				

4. Assessment plan

Assessment Type	**CLO1**	**CLO2**	**CLO3**
Quiz (5%)	X	X	
Labs (20%)		X	
Midterm examination (30%)	X	X	X

Projects/Presentations/ Report (10%)		X	X
Final examination (40%)	X	X	X

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

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1. When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.↩

5. Rubrics (optional)

5.1. Grading checklist

Grading checklist for Written Reports			
Student: …….. Date: ……	HW/Assignment: ……. Evaluator: ……		
	Max.	**Score**	**Comments**
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)	10		
TOTAL SCORE	100		

5.2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	**Description**

5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	Issue/ problem to be considered critically is stated without clarification or description.
Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation/ evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.

			mostly fact, with little questioning.	
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.
Conclusions and related outcomes (implications and	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and

consequences)	perspectives discussed in priority order.	(consequences and implications) are identified clearly.	outcomes (consequences and implications) are identified clearly.	implications) are oversimplified.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness)	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness)	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness)	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the

	make the presentation compelling, and speaker appears polished and confident.	make the presentation interesting, and speaker appears comfortable.	make the presentation understandable, and speaker appears tentative.	understandability of the presentation, and speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: August 29th, 2023

Ho Chi Minh City, 29/08/2023

Dean of School of Computer Science and Engineering

Assoc.Prof. Nguyen Van Sinh

Course Name: Blockchain
Course Code: IT150IU

1. **General information**

Course designation	Introduction to Blockchain technology
Semester(s) in which the course is taught	
Person responsible for the course	Tran Thanh Tung, Dr.
Language	English
Relation to curriculum	Elective
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: Contact hours (please specify whether lecture, exercise, laboratory session, etc.): Private study including examination preparation, specified in hours: Student responsibility: Students are expected to spend at least 8 hours per week for self – studying. This time should be made up of reading, working on exercises and problems and group assignment.
Credit points	Number of credits : 4 Lecture: 3 Laboratory: 1
Required and recommended prerequisites for joining the course	None
Course objectives	This subject introduces the students the foundation of blockchain technology and its applications. Students will study blockchain concepts and principles how it works. This course covers relevant topics blockchain space. The course starts with the basics of blockchain, cryptography, fundamental understanding of bitcoins. Then, the applications of blockchain technology is introduced in different areas of finance, healthcare, supply chain, etc. A complete picture of the ecosystem surrounding blockchain technology and development trends are also discussed.
Course learning outcomes	CLO 1. Understand basic contents of blockchain technology. CLO 2. Explain different types of blockchain development: Ethereum, smart contract security, bitcoin CLO 3. Apply blockchain techniques to setup the development environment to writing and deploying smart contracts, the workhorse of blockchain applications, integrating cryptocurrency micropayments into web apps CLO 4. Work in a team to build a blockchain application project.

Competency level	Course learning outcome (CLO)
Knowledge	CLO1, CLO1
Skill	CLO3, CLO4
Attitude	CLO2

Content

The description of the contents should clearly indicate the weighting of the content and the level.
Weight: lecture session (~~3~~ hours)
Teaching levels: I (Introduce); T (Teach); U (Utilize)

Topic	Weight	Level
Introduction	3	I
Cryptography & cryptocurrencies	3	T
How Bitcoin achieve decentralization	3	I, T
Mechanics of Bitcoin	3	T, U
How to store and use Bitcoin	3	T, U
Bitcoin mining	3	T
Bitcoin and Anonymity	3	T
Ethereum	3	I, T
Solidity	3	T, U
Token	3	I, T
Oracle	3	I, T
Decentralized Applications (Dapps)	3	T, U
Design pattern for blockchain applications	3	T
Real-world applications	3	I, T

Examination forms

Multiple-choice questions, short-answer questions

Study and examination requirements

Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.
Assignments/Examination: Students must have more than 50/100 points overall to pass this course.

Reading list

[1] Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, and Steven Goldfeder. Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction. Princeton, 2016
[2] Andreas M. Antonopoulos, and Gavin Wood Ph. D. Mastering Ethereum: Building Smart Contracts and DApps. O'Reilly Media, 2018
[3] Xiwei Xu, Ingo Weber, and Mark Staples. Architecture for Blockchain Applications. Springer, 2019.

2. Learning Outcomes Matrix (optional)

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO					
CLO	1	2	3	4	5	6
1	X					
2	X	X				
3		X				X
4						X

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
1	Introduction	1	Quiz	Teaching, Presentation	
2	Cryptography & cryptocurrencies	1	Quiz, In-class exercises	Teaching, Presentation	
3	How Bitcoin achieve decentralization	1, 2	Quiz, In-class exercises	Teaching, Presentation	
4	Mechanics of Bitcoin	1, 2	Quiz, In-class exercises	Teaching, Presentation	
5	How to store and use Bitcoin	1, 2	Quiz, In-class exercises	Teaching, Presentation	
6	Bitcoin mining	1, 2	Quiz, In-class exercises	Teaching, Presentation	
7	Bitcoin and Anonymity	2	Quiz, In-class exercises	Teaching, Presentation	
8	**Midterm**				
9	Ethereum	2,3	Project	Teaching, Presentation	
10	Solidity	2,3	Project	Teaching, Presentation	
11	Token	3,4	Quiz, In-class exercises	Teaching, Presentation	
12	Oracle	2,3	Quiz, In-class exercises	Teaching, Presentation Group discussion	
13	Decentralized Applications (Dapps)	3,4	Quiz, In-class exercises	Teaching, Presentation	

Week	Topic	CLO	Assessments	Learning activities	Resources
14	Design pattern for blockchain applications	3,4	Quiz, In-class exercises	Teaching, Presentation, In-class reading	
15	Real-world applications	3,4	Presentation	Teaching, Presentation Group discussion	
16	**Final exam**				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
Labs (20%)			x	x
Midterm examination (30%)	x	x		
Final examination (40%)		x	x	
Exercises/ Quiz (10%)	x			

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

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1. When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.↩

4. Rubrics (optional)

5.1. Grading checklist

Grading checklist for Written Reports			
Student: …….. Date: ……	HW/Assignment: ……. Evaluator: ……		
	Max.	**Score**	**Comments**
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			

Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)	10		
TOTAL SCORE	100		

5.2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	**Description**
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/ or	Issue/ problem to be considered critically is stated without clarification or description.

			backgrounds unknown.	
Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation / evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into	Specific position (perspective, thesis/hypothesis) takes into account the complexities of	Specific position (perspective, thesis/ hypothesis) acknowledges different	Specific position (perspective, thesis/ hypothesis) is stated, but is

	account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	sides of an issue.	simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequence s and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequence s and implications) are oversimplifie d.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable

	consistently observable and is skillful and makes the content of the presentation cohesive.	consistently observable within the presentation.	observable within the presentation.	within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities)

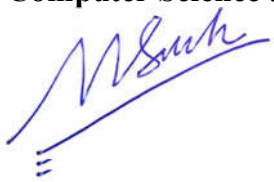
	authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022

Dean of School of Computer Science and Engineering



Assoc.Prof. Nguyen Van Sinh

Course Name: Game Development
Course Code: IT167IU

1. **General information**

Course designation	This course is an introduction to the theory and practice of the process of designing games and playful experiences.
Semester(s) in which the course is taught	7,9
Person responsible for the course	Dr. Le Duy Tan
Language	English
Relation to curriculum	Compulsory
Teaching methods	Lecture
Workload (incl. contact hours, self-study hours)	Total workload: 182.5 hours Contact hours (please specify whether lecture, exercise, laboratory session, etc.): Lecture: 37.5 hours + Laboratory: 25 hours. Private study including examination preparation, specified in hours: 120 hours.
Credit points	Number of credits: 4 Lecture: 3 Laboratory: 1
Required and recommended prerequisites for joining the course	Object Oriented Programming
Course objectives	This course is an introduction to the theory and practice of the process of designing games and playful experiences. Students are familiarized with methods, concepts, techniques, and literature used in the design of games. The strategy is process-oriented, focusing on aspects such as: Rapid prototyping, play testing, and design iteration using a player-centered approach.
Course learning outcomes	CLO 1. Understand the emergence of the academic study of design methods and game design. CLO 2. Able to structure and conduct a game design project from conceptualization to playable prototype. CLO 3. Solve a real-world problem using game design knowledge through group collaboration.

		Competency level	**Course learning outcome (CLO)**
		Knowledge	1
		Skill	2, 3
		Attitude	3
Content	*The description of the contents should clearly indicate the weighting of the content and the level.* Weight: lecture session (3 hours) Teaching levels: I (Introduce); T (Teach); U (Utilize)		

Topic	**Weight**	**Level**
Introduction to Game Development	1	I
Platforms and Publishing	3	T
Game Development Cycle	3	T, U
Principles of Game Design	3	T, U
Trade-Offs in Game Design	2	T, U
Game Engines, Game Systems and Elements; Map and Level Editors	2	T
Games Marketing and Distribution	1	T

Examination forms	Short-answer questions, Programming exercises
Study and examination requirements	Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. Assignments/Examination: Students must have more than 50/100 points overall to pass this course.
Reading list	2. Nystrom, Robert. Game programming patterns. Genever Benning, 2014. 3. Gregory, Jason. Game engine architecture. crc Press, 2018.

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

CLO\SLOT	1	2	3	4	5	6
1	X					
2		XXX				
3						X

5. *Planned learning activities and teaching methods*

Week	Topic	CLO	Assessments	Learning activities	Resources
1	Introduction to Game Development	1	Quiz	Lecture	1
2	Platforms and Publishing – Part 1	1	Quiz	Lecture	1
3	Platforms and Publishing – Part 2	1	Quiz	Lecture, Discussion, In-class Exercise	2
4	Platforms and Publishing – Part 3	2, 3	Quiz, Lab, Midterm	Lecture, Discussion, In-class Exercise	1
5	Game Development Cycle – Part 1	2, 3	Quiz, Lab, Midterm	Lecture, Discussion, In-class Exercise	1
6	Game Development Cycle – Part 2	2, 3	Quiz, Lab, Midterm	Lecture, Discussion, In-class Exercise	2
7	Game Development Cycle – Part 3	2, 3	Quiz, Lab, Midterm	Lecture, Discussion, In-class Exercise	1
8	Principles of Game Design – Part 1	2, 3	Quiz, Lab, Midterm	Lecture, Discussion, In-class Exercise	1
Midterm					
9	Principles of Game Design – Part 2	2, 3	Quiz, Lab, Final	Lecture, Discussion, In-class Exercise	1
10	Principles of Game Design – Part 3	2, 3	Quiz, Lab, Final	Lecture, Discussion, In-class Exercise	1
11	Trade-Offs in Game Design – Part 1	2, 3	Quiz, Lab, Final	Lecture, Discussion, In-class Exercise	1

12	Trade-Offs in Game Design – Part 2	2, 3	Quiz, Lab, Final	Lecture, Discussion, In-class Exercise	1
13	Game Engines, Game Systems and Elements; Map and Level Editors – Part 1	2, 3	Quiz, Lab, Final	Lecture, Discussion, In-class Exercise	1, 2
14	Game Engines, Game Systems and Elements; Map and Level Editors – Part 2	2, 3	Quiz, Lab, Final	Lecture, Discussion, In-class Exercise	1
15	Games Marketing and Distribution	2, 3	Quiz, Lab, Final	Lecture, Discussion, In-class Exercise	1
Final					

4. **Assessment plan**

Assessment Type	**CLO1**	**CLO2**	**CLO3**
Quiz / Assigment (10%)	50%	10%	10%
Labs (20%)	10%	30%	30%
Midterm examination (30%)	30%	30%	30%
Final examination (40%)	10%	30%	30%

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. **Rubrics (optional)**

5.4. Grading checklist

Grading checklist for Written Reports			
Student: …… HW/Assignment: ……. Date: …… Evaluator: ……			
	Max.	**Score**	**Comments**
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			

Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)	10		
TOTAL SCORE	100		

5.5. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	**Description**
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.6. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	Issue/ problem to be considered critically is stated without clarification or description.

Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation/ evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretatio n/ evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypot hesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within	Specific position (perspective, thesis/hypothesi s) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective,	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.

	position (perspective, thesis/ hypothesis).	thesis/ hypothesis).		
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.

Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's

	presentation or establishes the presenter's credibility/ authority on the topic.	presenter's credibility/ authority on the topic.	presenter's credibility/ authority on the topic.	credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: August 28, 2023

Ho Chi Minh City, 28/08/2023

Dean of School of Computer Science and Engineering

Assoc.Prof. Nguyen Van Sinh

Course Name: Development and Operations (DevOps)
Course Code: IT156IU

1. General information

Course designation	This course is an introduction to DevOps to help students understand its principles and practices. Key concepts and terminology will be covered with real-life case studies, examples and practical exercises. Common and popular tools to achieve DevOps models will be introduced as well.
Semester(s) in which the course is taught	7,8
Person responsible for the course	Tran Thanh Tung, PhD.
Language	English
Relation to curriculum	Elective (NE)
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	Total workload: 195 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 45 (lecture) + 30 (laboratory) Private study including examination preparation, specified in hours: 120
Credit points	Number of credits: 4 Lecture: 3 Laboratory: 1
Required and recommended prerequisites for joining the course	None
Course objectives	This course is an introduction to DevOps to help students understand its principles and practices. Key concepts and terminology will be covered with real-life case studies, example and practical exercises. Common and popular tools to achieve DevOps models will be introduced as well.
Course learning outcomes	CLO 1. Define and discuss the key concepts and principles of DevOps CLO 2 Explain the benefit of DevOps and continuous delivery CLO 3 Understand infrastructure automation, build and deployment automation, the transformation to DevOps models CLO 4. Work with common and popular DevOps tools

Competency level	Course learning outcome (CLO)
Knowledge	1,2
Skill	3,4
Attitude	4

Content

The description of the contents should clearly indicate the weighting of the content and the level.
Weight: lecture session (~~3~~ hours)
Teaching levels: I (Introduce); T (Teach); U (Utilize)

Topic	Weight	Level
Introduction to DevOps	3	I
Introduction to Cloud Computing	3	I
Linux Basics and Shell Scripting	3	T,U
Versioning and Build Tool	3	T
Automation: Continuous Integration, Continuous Deployment	3	T
Configuration Management	3	I,T
Containers, Container vs Virtual Machine	3	I,T
Deployment pipeline	3	I,T
Post production	3	I,T
Disaster recovery	3	I
Continuous Monitoring for DevOps	3	I,T
Infrastructure and deployment security	3	I

Examination forms

Short-answer questions

Study and examination requirements

Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.
Assignments/Examination: Students must have more than 50/100 points overall to pass this course.

Reading list

[1] Jeffery D.Smith, Operations Anti-Patterns, DevOps Solutions, Manning Publications 2020

[2] Nicole Forsgren, Accelerate: The Science of Lean Software and DevOps: Building and Scaling High Performing Technology Organizations, IT Revolution Press 2018

[3] Jez Humble and David Farley. Continuous Delivery: Reliable Software Releases through Build, Test, and Deployment Automation, Addison-Wesley Professional, 2010

[4] Paul M. Duvall, Steve Matyas, Andrew Glover. Continuous Integration: Improving Software Quality and Reducing Risk,

	Addison-Wesley Professional, 2007Len Bass and John Klein. Deployment and Operations for Software Engineers, 2019.

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	1	2	3	4	5	6
1	x					
2	x					
3		x				
4						x

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
1	Introduction to DevOps				
2,3	Introduction to Cloud Computing				
4,5	Linux Basics and Shell Scripting				
6	Versioning and Build Tool				
7	Automation: Continuous Integration, Continuous Deployment				
8	Configuration Management				
Midterm exam					
9,10	Containers, Container vs Virtual Machine				
11	Deployment pipeline				
12	Post production				
13	Disaster recovery				
14	Continuous Monitoring for DevOps				
15	Infrastructure and deployment security				
Final exam					

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
Quiz (5%)	10%		20%	20%
Labs (10%)	30%	30%		
Midterm examination (30%)	50%	40%		
Projects/Presentations/ Report (15%)	10%		30%	30%
Final examination (40%)		30%	50%	50%

5. Rubrics (optional)

5.1. Grading checklist

Grading checklist for Written Reports			
Student: …….. Date: ……	HW/Assignment: ……. Evaluator: ……		
	Max.	**Score**	**Comments**
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)	10		
TOTAL SCORE	100		

5.2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	**Description**
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.

3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	Issue/ problem to be considered critically is stated without clarification or description.
Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation / evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.

Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's	Conclusion is logically tied to a range of information, including opposing viewpoints; related	Conclusion is logically tied to information (because information is chosen to fit the	Conclusion is inconsistently tied to some of the information discussed; related outcomes

	informed evaluation and ability to place evidence and perspectives discussed in priority order.	outcomes (consequences and implications) are identified clearly.	desired conclusion); some related outcomes (consequences and implications) are identified clearly.	(consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.

Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable,	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

	and strongly supported.)			

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022

Dean of School of Computer Science and Engineering

Assoc.Prof. Nguyen Van Sinh

Course Name: Data Science and Visualization
Course Code: IT138IU

1. General information

Course designation	
Semester(s) in which the course is taught	
Person responsible for the course	Tran Thanh Tung, Dr.
Language	English
Relation to curriculum	Compulsory / elective / specialisation Names of other study programmes with which the module is shared
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: Contact hours (please specify whether lecture, exercise, laboratory session, etc.): Private study including examination preparation, specified in hours: Student responsibility: Students are expected to spend at least 8 hours per week for self – studying. This time should be made up of reading, working on exercises and problems and group assignment.
Credit points	Number of credits : 4 Lecture: 3 Laboratory: 1
Required and recommended prerequisites for joining the course	none
Course objectives	The goal of this course is to introduce students to the key principles, methods, and techniques for effective visual analysis of data. The course begins with aims and key principles of data visualization. The course continues with different aspects of visualization including techniques and method for presenting different data types, and for discussing and analyzing visualizations. Thorough the course, students will be introduced to many visualization systems and visual tools via hand-on exercises.
Course learning outcomes	CLO 1. Understand the principles of data and graphic design. CLO 2. Create well-designed data visualizations with appropriate tools. CLO 3. Evaluate a visualization design.

Competency level	Course learning outcome (CLO)
Knowledge	
Skill	

	Attitude	

Content

The description of the contents should clearly indicate the weighting of the content and the level.
Weight: lecture session (~~3~~ hours)
Teaching levels: I (Introduce); T (Teach); U (Utilize)

Topic	Weight	Level
Visualization design principles		
Perception, Cognition, Color		
Data abstraction, data types		
Visual encoding with marks and channels		
Tasks and Interactivity		
Validation and visualization		
Arrange text and sets		
Arrange spatial data		
Arrange tree and graphs/networks		
Facets and views		
Focus+Context		
Filtering and Aggregation		

Examination forms

Multiple-choice questions, short-answer questions

Study and examination requirements

Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.
Assignments/Examination: Students must have more than 50/100 points overall to pass this course.

Reading list

2. Learning Outcomes Matrix (optional)

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO					
CLO	1	2	3	4	5	6
1						
2						
3						
4						

3. **Planned learning activities and teaching methods**

Week	Topic	CLO	Assessments	Learning activities	Resources
1	Visualization design principles				
2	Perception, Cognition, Color				
3	Data abstraction, data types				
4	Visual encoding with marks and channels				
5	Tasks and Interactivity				
6	**Midterm**				
7	Validation and visualization				
8	Arrange text and sets				
9	Arrange spatial data				
10	Arrange tree and graphs/networks				
11	Facets and views				
12	Focus+Context				
13	Filtering and Aggregation				
14	**Final exam**				

4. **Assessment plan**

Assessment Type	CLO1	CLO2	CLO3
Labs (20%)		x	x
Midterm examination (30%)	x	x	
Final examination (40%)		x	x
Exercises/ Quiz (10%)	x	x	

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

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1. When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.↩

5. **Rubrics (optional)**

5.1. Grading checklist

Grading checklist for Written Reports			
Student: …….. Date: ……	HW/Assignment: ……. Evaluator: ……		
	Max.	**Score**	**Comments**
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)	10		
TOTAL SCORE	100		

5.2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	**Description**
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	Issue/ problem to be considered critically is stated without clarification or description.
Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation / evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.

Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's	Conclusion is logically tied to a range of information, including opposing viewpoints; related	Conclusion is logically tied to information (because information is chosen to fit the	Conclusion is inconsistently tied to some of the information discussed; related outcomes

	informed evaluation and ability to place evidence and perspectives discussed in priority order.	outcomes (consequences and implications) are identified clearly.	desired conclusion); some related outcomes (consequences and implications) are identified clearly.	(consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.

Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated,	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

	memorable, and strongly supported.)			

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022

Dean of School of Computer Science and Engineering

Assoc.Prof. Nguyen Van Sinh

Course Name: Digital Image Processing
Course Code: IT130IU

1. General information

Course designation	This course provides students fundamental knowledge of digital image processing
Semester(s) in which the course is taught	
Person responsible for the course	Dr. Ha Viet Uyen Synh
Language	English
Relation to curriculum	Elective (All programs)
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	Total workload: 195 Contact hours: 45 (lecture) + 30 (laboratory) Private study including examination preparation, specified in hours: 120
Credit points	Number of credits : 4 Lecture: 3 Laboratory: 1
Required and recommended prerequisites for joining the course	
Course objectives	This course helps students discuss digital image processing fundamentals; review of Digital Signal Processing algorithms such as Discrete Fourier Transform; intensity transforms, frequency domain filtering; image restoration and reconstruction; color image processing; multiresolution processing; image compression; morphological image processing.
Course learning outcomes	CLO 1. Understand bases of digital image formation. CLO 2. Understand the color image foundations. CLO 3. Apply special-domain image filtering. <table><tr><th>Competency level</th><th>Course learning outcome (CLO)</th></tr><tr><td>Knowledge</td><td>1,2</td></tr><tr><td>Skill</td><td>3</td></tr><tr><td>Attitude</td><td></td></tr></table>
Content	*The description of the contents should clearly indicate the weighting of the content and the level.* Weight: lecture session (3 hours) Teaching levels: I (Introduce); T (Teach); U (Utilize)

	Topic	Weight	Level
	Chapter 1: Introduction	3	I, T
	Chapter 2: Digital Image Fundamentals	6	I, T
	Chapter 3: Intensity Transformations and Spatial Filtering (part 1)	3	T, U
	Chapter 3: Intensity Transformations and Spatial Filtering (part 2)	6	T, U
	Chapter 4: Filtering in the frequency domain	6	T, U
	Chapter 5: Image restoration and reconstruction	3	T, U
	Chapter 6: Color Image processing	3	T, U
	Chapter 7: Wavelets and multiresolution processing (part 1)	3	T, U
	Chapter 7: Wavelets and multiresolution processing (part 2)	3	T, U
	Chapter 8: Image compression	3	T, U
	Chapter 9: Morphological image processing	3	T, U
	Chapter 10: Image segmentation	3	T, U
	Chapter 11: Representation and description	3	T, U
	Chapter 12: Object recognition	3	T, U
	Revision Application Design and Development	3	
Examination forms	Multiple-choice questions, short-answer questions		
Study and examination requirements	Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. Assignments/Examination: Students must have more than 50/100 points overall to pass this course.		
Reading list	**1.** Rafael C. Gonzalez, Richard E. Woods, Digital Image Processing 3rd, 2008		

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO					
CLO	1	2	3	4	5	6
1	x	x				
2	x	x				

3						x

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
1	Chapter 1: Introduction	1,2	Quiz, Lab, Exam	lecture, exercises	
2	Chapter 2: Digital Image Fundamentals	1,2	Quiz, Lab, Exam	lecture, exercises, lab	
3	Chapter 3: Intensity Transformations and Spatial Filtering (part 1)	1,2,3	Quiz, Lab, Exam	lecture, exercises, lab	
4	Chapter 3: Intensity Transformations and Spatial Filtering (part 2)	1,2,3	Quiz, Lab, Exam	lecture, exercises, lab	
5	Chapter 4: Filtering in the frequency domain	1,2	Quiz, Lab, Exam	lecture, exercises, lab	
6	Chapter 5: Image restoration and reconstruction	1,2	Quiz, Lab, Exam	lecture, exercises, lab	
7	Chapter 6: Color Image processing	1,2	Quiz, Lab, Exam	lecture, exercises, lab	
8	**Midterm**				
9	Chapter 7: Wavelets and multiresolution processing (part 1)	2,3	Quiz, Lab, Exam	lecture, exercises, lab	
10	Chapter 7: Wavelets and multiresolution processing (part 2)	2,3	Quiz, Lab, Exam	lecture, exercises, lab	
11	Chapter 8: Image compression	2,3	Quiz, Lab, Exam	lecture, exercises, lab	
12	Chapter 9: Morphological image processing	2,3	Quiz, Lab, Exam	lecture, exercises, lab	
13	Chapter 10: Image segmentation	2,3	Quiz, Lab, Exam	lecture, exercises, lab	
14	Chapter 11: Representation and description	2,3	Quiz, Lab, Exam	lecture, exercises, lab	

15	Chapter 12: Object recognition	2,3	Quiz, Lab, Exam	lecture, exercises, lab	
16	Revision Application Design and Development	1,2,3			
17	**Final exam**				

4. Assessment plan

Assessment Type	**CLO1**	**CLO2**	**CLO3**
Labs (20%)	20%	20%	20%
Midterm examination (30%)	30%	30%	30%
Final examination (40%)	40%	40%	40%
Exercises/ Quiz (10%)	10%	10%	10%

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

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5. Rubrics (optional)

5.1. Grading checklist

Grading checklist for Written Reports			
Student: …….. Date: ……	HW/Assignment: ……. Evaluator: ……		
	Max.	**Score**	**Comments**
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)	10		
TOTAL SCORE	100		

5.2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	**Description**
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	Issue/ problem to be considered critically is stated without clarification or description.
Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are	Information is taken from source(s) with some interpretation/ evaluation, but not enough to develop a coherent analysis or	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.

	experts are questioned thoroughly.	subject to questioning.	synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.

Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.

	Language in presentation is appropriate to audience.	appropriate to audience.	appropriate to audience.	
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.

Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022

Dean of School of Computer Science and Engineering

Assoc.Prof. Nguyen Van Sinh

Course Name: Software Architecture
Course Code: IT114IU

1. General information

Course designation	This course provides student methodogies and techniques in Software Architecture.
Semester(s) in which the course is taught	
Person responsible for the course	Dr. Ha Viet Uyen Synh
Language	English
Relation to curriculum	Elective (CS)
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	Total workload: 195 Contact hours: 45 (lecture) + 30 (laboratory) Private study including examination preparation, specified in hours: 120
Credit points	Number of credits : 4 Lecture: 3 Laboratory: 1
Required and recommended prerequisites for joining the course	
Course objectives	Provides the student with a thorough understanding of varying methodologies and techniques in analysis, design and implementation of information system by using UML.
Course learning outcomes	CLO 1. Understand the steps of the System Development Life Cycle and the techniques for each step CLO 2. Using a CASE tool in analysis and design of a system. CLO 3. Apply to a real system

Competency level	Course learning outcome (CLO)
Knowledge	1,2
Skill	3
Attitude	

Content

The description of the contents should clearly indicate the weighting of the content and the level.
Weight: lecture session (~~3~~ hours)
Teaching levels: I (Introduce); T (Teach); U (Utilize)

Topic	Weight	Level
Introduction to systems analysis and design,	3	I

	Requirements.	3	T,U
	Use Case Modeling	6	T,U
	Dynamic Modeling	6	T,U
	State-Dependent Dynamic Interaction Modeling	6	T,U
	Data Modeling	6	T,U
	Normal Forms	6	T,U
	Structural Modeing	6	T,U
	Architectural Design.	3	I,T
Examination forms	Multiple-choice questions, short-answer questions		
Study and examination requirements	Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. Assignments/Examination: Students must have more than 50/100 points overall to pass this course.		
Reading list	1. Kenneth E. Kendall, Julie E. Kendall, Systems Analysis and Design 7th, 2006 2. Gary B. Shelly, Thomas J. Cashman, Harry J. Rosenblatt, Systems Analysis and Design 4th, 2001		

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO					
CLO	1	2	3	4	5	6
1			x			
2			x			
3		x				

3. Planned learning activities and teaching methods

Week	**Topic**	**CLO**	**Assessments**	**Learning activities**	**Resources**
1	Introduction to systems analysis and design,	1,2	Quiz	lecture, exercises	
2	Requirements.	1,2,3	Quiz, Lab	lecture, exercises, lab	
3	Use Case Modeling	1,2,3	Quiz, Lab, Exam	lecture, exercises, lab	
4	**Midterm**				

5	Dynamic Modeling	1,2,3	Quiz, Lab, Exam	lecture, exercises, lab	
6	State-Dependent Dynamic Interaction Modeling	1,2,3	Quiz, Lab, Exam	lecture, exercises, lab	
7	Data Modeling	1,2,3	Quiz, Lab, Exam	lecture, exercises, lab	
8	Normal Forms	1,2,3	Quiz, Lab, Exam	lecture, exercises, lab	
9	Structural Modeing	1,2,3	Quiz, Lab, Exam	lecture, exercises, lab	
10	Architectural Design.	1,2	Quiz	lecture, exercises	
11	**Final exam**				

4. Assessment plan

Assessment Type

Assessment Type	**CLO1**	**CLO2**	**CLO3**
Midterm examination (30%)	30%	30%	30%
Final examination (40%)	40%	40%	40%
Exercises/ Quiz (10%)	10%	10%	10%
Lab. Assignments (20%)	20%	20%	20%

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

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5. Rubrics (optional)

5.1. Grading checklist

Grading checklist for Written Reports			
Student: …….. Date: ……	HW/Assignment: ……. Evaluator: ……		
	Max.	**Score**	**Comments**
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		

Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)	10		
TOTAL SCORE	100		

5.2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	**Description**
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/ or	Issue/ problem to be considered critically is stated without clarification or description.

			backgrounds unknown.	
Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation / evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into	Specific position (perspective, thesis/hypothesis) takes into account the complexities of	Specific position (perspective, thesis/ hypothesis) acknowledges different	Specific position (perspective, thesis/ hypothesis) is stated, but is

	account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	sides of an issue.	simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequence s and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequence s and implications) are oversimplifie d.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable

	consistently observable and is skillful and makes the content of the presentation cohesive.	consistently observable within the presentation.	observable within the presentation.	within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities)

	authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022

Dean of School of Computer Science and Engineering

Assoc.Prof. Nguyen Van Sinh

Course Name: Data Mining
Course Code: IT160IU

1. General information

Course designation	This subject introduces the students to the principles and algorithms of data mining, and the requirements of a data mining process.
Semester(s) in which the course is taught	
Person responsible for the course	Dr. Nguyen Thi Thanh Sang
Language	English
Relation to curriculum	Elective (CS, NE, CE) Compulsory (DS)
Teaching methods	Lecture, lesson, project, laboratory.
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: 195 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 45 (lecture) + 30 (laboratory) Private study including examination preparation, specified in hours: 120
Credit points	Number of credits: 4 Lecture: 3 Laboratory: 1
Required and recommended prerequisites for joining the course	Object-Oriented Programming
Course objectives	Students will study data mining concepts and algorithms to solve problems of knowledge discovery. They will be equipped with skills of using recent data mining software for solving practical problems and gain experience of doing independent study and research.
Course learning outcomes	

Competency level	**Course learning outcome (CLO)**
Knowledge	CLO 1. Understand basic contents of data warehousing and data mining. CLO 2. Explain modern algorithms in the area of data mining and knowledge discovery.
Skill	CLO 3. Apply data mining techniques to some case studies using existing datasets.

	Attitude	CLO 4. Work in a team to build a data mining process.

Content

The description of the contents should clearly indicate the weighting of the content and the level.
Weight: lecture session (3 hours)
Teaching levels: I (Introduce); T (Teach); U (Utilize)

Topic	**Weight**	**Level**
Introduction to Data Mining	1	I
Know your data	1	T, U
Data preprocessing	1	T, U
Data mining knowledge representation	1	T, U
Evaluating what's been learned	1	T
Data mining algorithms: Classification	2	T, U
Mining Frequent Patterns, Association and Correlations: Basic Concept and Methods	2	T
Data mining algorithms: Clustering	2	T
Classification: Advanced Methods	1	T, I
Semantic data mining	1	I

Examination forms

Multiple-choice questions, short-answer questions

Study and examination requirements

Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.
Assignments/Examination: Students must have more than 50/100 points overall to pass this course.

Reading list

[1] Jiawei Han, Micheline Kamber, *Data Mining: Concepts and Techniques*, 3rd Edition, 2011.

[2] Ian H.Witten, Eibe Frank, Mark A. Hall, and Christopher J. Pal, *Data Mining: Practical Machine Learning Tools and Techniques*, Fourth Edition, Morgan Kaufmann, 2016.

[3] A. Lawrynowicz, *Semantic Data Mining: An Ontology-based Approach (Studies on the Semantic Web)*, IOS Press (April 15, 2017), ISBN-10 1614997454.

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO					
CLO	1	2	3	4	5	6

1	x					
2	x					
3						x
4					x	

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
1	Introduction to Data Mining	1		Lecture, Discussion	[1, 2]. Chapter 1
2	Know your data	1	Quiz.s2	Lecture, In-class quiz	[1]. Chapter 2
3	Data preprocessing	1,4		Lecture, Discussion	[1]. Chapter 3
4	Data mining knowledge representation	1	Quiz.s4	Lecture, In-class quiz	[2]. Chapter 3; Reading [1]. Chapter 4 – Data Warehousing
5	Evaluating what's been learned	1	Quiz.s5	Lecture, In-class quiz	[2]. Chapter 5
6-7	Data mining algorithms: Classification	2,3	Quiz.s6-7	Lecture, In-class quiz	[1]. Chapter 8; [2]. Chapter 4.3
8	Data mining to code	3		Lecture, Discussion	
9	**Midterm**				
10-11	Mining Frequent Patterns, Association and Correlations: Basic Concept and Methods	2,3,4	Quiz.s10-11	Lecture, In-class quiz	[1]. Chapter 6; [2]. Chapter 4.5
12-13	Data mining algorithms: Clustering	2,3,4	Quiz.s12-13	Lecture, In-class quiz	[1]. Chapter 10; [2]. Chapter 4.8
14	Classification: Advanced Methods	2	Quiz.s14	Lecture, In-class quiz	[1]. Chapter 9
15	Semantic data mining	2		Lecture, Discussion	[3]
16	Revision			Review-test	
17	**Final exam**				

Laboratory

Week	Lab
5	Introduction to Weka
6	Evaluation
7	Simple classifiers
8	Programming - Pre-processing data
9	More classifiers
10	Putting it all together
11	Programming - Clustering
12	Programming - Sequential pattern discovery

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
Labs (10%)			100%	
Programming (20%)			70%	30%
Midterm examination (30%)	50%	50%		
Final examination (40%)		40%	60%	

5. Rubrics (optional)

5.1. Grading checklist

Grading checklist for Written Reports			
Student: …….. Date: ……	HW/Assignment: ……. Evaluator: ……		
	Max.	**Score**	**Comments**
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)	10		
TOTAL SCORE	100		

5.2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	**Description**
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	Issue/ problem to be considered critically is stated without clarification or description.
Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or	Information is taken from source(s) with some interpretation / evaluation, but not enough to develop a	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact,

	synthesis. Viewpoints of experts are questioned thoroughly.	synthesis. Viewpoints of experts are subject to questioning.	coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective,	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.

	thesis/ hypothesis).			
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022

Dean of School of Computer Science and Engineering

Assoc.Prof. Nguyen Van Sinh

Course Name: IT Project Management
Course Code: IT056IU

1. General information

Course designation	This subject introduces to students the process of IT project management; the area of knowledge required and techniques appropriate for successful IT project management.
Semester(s) in which the course is taught	
Person responsible for the course	Assoc. Prof. Nguyen Van Sinh
Language	English
Relation to curriculum	All programs: Elective course
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	Total workload: 195 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 45 (lecture) + 30 (laboratory) Private study including examination preparation, specified in hours: 120
Credit points	Number of credits : 4 Lecture: 3 Laboratory: 1
Required and recommended prerequisites for joining the course	Object-Oriented Programming Web application development Software engineering
Course objectives	This course provides students the fundamental IT project management knowledge, with particular emphasis on software products, project management and contemporary issues in the delivery of software solutions to business. It considers plan-driven and agile methodologies, estimating techniques, change management, risk management, and the role of project management in business. And it identifies the managerial control and reporting aspects necessary from inception to implementation of a software development project.
Course learning outcomes	CLO 1. Explain the IT project management process; CLO 2. Identify the areas of knowledge required for successful IT project management; CLO 3. Apply techniques appropriate for successful software project management;

CLO 4. Communicate effectively to the team and stakeholders; construct project related documentation.

Competency level	Course learning outcome (CLO)
Knowledge	CLO1
Skill	CLO2, CLO3
Attitude	CLO4

Content

The description of the contents should clearly indicate the weighting of the content and the level.
Weight: lecture session (3 teaching hours)
Teaching levels: I (Introduce); T (Teach); U (Utilize)

Topic	Weight	Level
Week 1: Orientation & Introduction to the course	3	I,T
Week 2: Introduction to IT project management	3	I,T
Week 3: Software project planning	3	I,T,U
Week 4: Estimation (cost, time, scope)	3	I,T,U
Week 5: Project Schedules	3	I,T,U
Week 6: Review process	3	I,T,U
Week 7: Software Requirement	3	I,T,U
Week 8: Design & Programming	3	I,T,U
Week 9: Review for midterm examination	3	U
Week 10: Design and Programming	3	I,T,U
Week 11: Software Testing	3	I,T,U
Week 12: Understanding Change	3	I,T,U
Week 13: Management and Leadership	3	I,T,U
Week 14: Managing an Outsourced Project	3	I,T,U
Week 15: Process Improvement.	3	I,T,U

Examination forms

Multiple-choice questions, short-answer questions and essay writing

Study and examination requirements

Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.
Assignments/Examination: Students must have more than 50/100 points overall to pass this course.

Reading list

1. Kathy Schwalbe, IT Project Management - 9th Edition, 2019
2. Stellman and Greene, *Applied Software Project Management*, O'Reilly Media, 2006.

	3. Marchewka, J.T., Information Technology Project Management Providing Measureable Organizational Value 5th, 2016

2. **Learning Outcomes Matrix**

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO					
CLO	1	2	3	4	5	6
1		X				
2		X	X			
3		X				X
4			X		X	

3. **Planned learning activities and teaching methods**

Week	**Topic**	**CLO**	**Assessments**	**Learning activities**	**Resources**
1	Orientation & Introduction to the course	1	Question and answer	Lecture,	[1, 2, 3]
2	Introduction to IT project management	1	Question and answer	Lecture, Discussion, In-class exercises	[1, 2, 3]
3	Software project planning	2,3	Quiz, Lab, Midterm exam	Lecture, Discussion, In-class exercises	[1, 2, 3]
4	Estimation (cost, time, scope)	2,3	Quiz, Lab, Midterm exam	Lecture, Discussion, In-class exercises	[1, 2, 3]
5	Project Schedules	2,3	Quiz, Lab, Midterm exam	Lecture, Discussion, In-class exercises	[1, 2, 3]
6	Review process	2,3	Quiz, Lab, Midterm exam	Lecture, Discussion, In-class exercises	[1, 2, 3]
7	Software Requirement	2,3,4	Quiz, Lab, Midterm exam	Lecture, Discussion,	[1, 2, 3]

				In-class exercises	
8	Design & Programming	2,3,4	Quiz, Lab, Midterm exam	Lecture, Discussion, In-class exercises	[1, 2, 3]
9	Review for midterm examination	1,2,3		Discussion, In-class exercises	
10	Design and Programming	2,3,4	Quiz, Lab, Final exam	Lecture, Discussion, In-class exercises	[1, 2, 3]
11	Software Testing	2,3,4	Quiz, Lab, Final exam	Lecture, Discussion, In-class exercises	[1, 2, 3]
12	Understanding Change	2,3,4	Quiz, Lab, Final exam	Lecture, Discussion, In-class exercises	[1, 2, 3]
13	Management and Leadership	2,3,4	Quiz, Lab, Final exam	Lecture, Discussion, In-class exercises	[1, 2, 3]
14	Managing an Outsourced Project	2,3,4	Quiz, Lab, Final exam	Lecture, Discussion, In-class exercises	[1, 2, 3]
15	Process Improvement.	2,3,4	Quiz, Lab, Final exam	Lecture, Discussion, In-class exercises	[1, 2, 3]
16	**Final examination**	2,3,4			

4. Assessment plan

Assessment Type	**CLO1**	**CLO2**	**CLO3**	**CLO4**
Midterm examination (30%)	40%	50%		
Projects/Presentations/ Report (20%)		40%	30%	30%
Final examination (40%)			70%	30%
Exercises/ Quiz (10%)	25%	25%	25%	25%

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics (optional)

5.1. Grading checklist

Grading checklist for Written Reports			
Student: …….. Date: ……	HW/Assignment: ……. Evaluator: ……		
	Max.	**Score**	**Comments**
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)	10		
TOTAL SCORE	100		

5.2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	**Description**
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**

Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	Issue/ problem to be considered critically is stated without clarification or description.
Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation / evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts

	presenting a position.		others' assumptions than one's own (or vice versa).	when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	Milestone		Benchmark
	4	3	2	1
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.

	polished and confident.			
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022

Dean of School of Computer Science and Engineering

Assoc.Prof. Nguyen Van Sinh

Course Name: Software Engineering
Course Code: IT076IU

1. General information

Course designation	This course focuses on the design of software by implementing significant projects in teams
Semester(s) in which the course is taught	
Person responsible for the course	Assoc. Prof. Dr. Nguyen Thi Thuy Loan
Language	English
Relation to curriculum	Compulsory (CS, CE) Elective (NE)
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	Total workload: 195 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 45 (lecture) + 30 (laboratory) Private study including examination preparation, specified in hours: 120
Credit points	Number of credits: 4 Lecture: 3 Laboratory: 1
Required and recommended prerequisites for joining the course	IT069IU (Object-Oriented Programming)
Course objectives	This course provides students the fundamentals of software engineering concepts, methodologies, and processes. It covers the subjects on software process models, agile development methodologies, requirements engineering and analysis models, software design and implementation methods, test strategies, and software evolution. Students apply contemporary agile requirements analysis, planning, architecture, design, implementation and testing practices to software engineering project work in small teams.
Course learning outcomes	CLO 1. Describe the implement of software development process. CLO 2. Apply the principles and methods of software engineering in practice. CLO3. Practice teamwork skills in a software engineering project.

Competency level	Course learning outcome (CLO)

	Knowledge	CLO1
	Skill	CLO2, CLO3
	Attitude	CLO3

Content

The description of the contents should clearly indicate the weighting of the content and the level.
Weight: lecture session (~~3~~ hours)
Teaching levels: I (Introduce); T (Teach); U (Utilize)

Topic	**Weight**	**Level**
Software development in practice	3	I
Beginning a project	3	T, U
Requirements	7.5	T, U
The user experience	4.5	T, U
System design	6	T, U
Program development	7.5	T, U
Reliability and testing	6	T, U
The business of software development	4.5	T, U
Review	3	I, U

Examination forms

Multiple-choice questions, short-answer questions

Study and examination requirements

Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.
Assignments/Examination: Students must have more than 50/100 points overall to pass this course.

Reading list

1. Ian Sommerville, Software Engineering 10th, 2019.
2. Hyrum Wright, Titus Winters, and Tom Manshreck. Software Engineering at Google, 2020
3. Hans van Vliet, Software Engineering: Principles and Practice 3rd, 2008

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO					
CLO	1	2	3	4	5	6
1						XXX
2			XX			XXX
3			XX		XXX	

3. **Planned learning activities and teaching methods**

Week	Topic	CLO	Assessments	Learning activities	Resources
1	Software development in practice	1	Quiz	Lecture	[1]
2	Beginning a project	1,3	Quiz, Midterm, Project	Lecture, Discussion, In-class, exercise	[1,3]
3	Requirements	2,3	Quiz, Midterm, Project	Lecture, Discussion, In-class, exercise	[1,2]
4	The user experience	2,3	Quiz, Midterm, Project	Lecture, Discussion, In-class, exercise	[1,2]
5	System design	2,3	Quiz, Midterm, Project	Lecture, Discussion, In-class, exercise	[1,2,3]
6	**Midterm**				
7	Program development	2,3	Quiz, Final, Project	Lecture, Discussion, In-class, exercise	[1,2,3]
8	Reliability and testing	2,3	Quiz, Final, Project	Lecture, Discussion, In-class, exercise	[1,2,3]
9	The business of software development	2,3	Quiz, Project	Lecture, Discussion, In-class, exercise	[1,2,3]
10	Review	1,3	Quiz	Discussion, In-class, exercise	[1,2]
11	**Final exam**				

4. **Assessment plan**

Assessment Type	CLO1	CLO2	CLO3
Midterm examination (25%)	30%	20%	
Projects/Presentations/ Report (25%)	30%	30%	60%
Final examination (40%)	30%	40%	
Exercises/ Quiz (10%)	10%	10%	40%

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

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1. **Rubrics (optional)**

5.1. Grading checklist

Grading checklist for Written Reports			
Student: …….. Date: ……	HW/Assignment: ……. Evaluator: ……		
	Max.	**Score**	**Comments**
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)	10		
TOTAL SCORE	100		

5.2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	**Description**
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	Milestone		Benchmark
	4	3	2	1
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	Issue/ problem to be considered critically is stated without clarification or description.
Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation / evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position.	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to

	contexts when presenting a position.		May be more aware of others' assumptions than one's own (or vice versa).	identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	Milestone		Benchmark
	4	3	2	1
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and

	appears polished and confident.	appears comfortable.	appears tentative.	speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022

Dean of School of Computer Science and Engineering

Assoc.Prof. Nguyen Van Sinh

Course Name: Object-Oriented Analysis and Design
Course Code: IT090IU

1. General information

1. Course designation	This course helps students learn about system life cycle development and the knowledge and skills required to develop object-oriented system.
Semester(s) in which the course is taught	
Person responsible for the course	MSc. Dao Tran Hoang Chau
Language	English
Relation to curriculum	Compulsory (CS)
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: 195 hours. Contact hours: Lecture 45 hours, Lab 30 hours: Private hours: 120 hours. Student responsibility: Students are expected to spend at least 8 hours per week for self – studying. This time should be made up of reading, working on exercises and problems and group assignment.
Credit points	Number of credits : 4 Lecture: 3 Laboratory: 1
Required and recommended prerequisites for joining the course	Object-Oriented Programming
Course objectives	The course tries to solve the following questions• What are design approaches other than object-oriented design? What is object-oriented design? • What is a good design? How do you differentiate between a good and a bad design? What are the important characteristics of a good design?
Course learning outcomes	CLO 1. Identify client needs based on a written or verbal specification; CLO 2. Know how analyze and design a system with object-oriented concepts and design patterns; CLO 3. Know how to work in team effectively;

Competency level	Course learning outcome (CLO)
Knowledge	1, 2
Skill	1, 3
Attitude	3

<table>
<tr><td>Content</td><td>The description of the contents should clearly indicate the weighting of the content and the level.
Weight: lecture session (45 hours)
Teaching levels: I (Introduce); T (Teach); U (Utilize)
<table>
<tr><th>Topic</th><th>Weight</th><th>Level</th></tr>
<tr><td>Software development life cycle;</td><td>2</td><td>T</td></tr>
<tr><td>Requirements gathering techniques;</td><td>1</td><td>T</td></tr>
<tr><td>Analyze client’s requirements;</td><td>4</td><td>T</td></tr>
<tr><td>Design and implementation the system;</td><td>6</td><td>T, U</td></tr>
<tr><td>Design patterns;</td><td>2</td><td>T, U</td></tr>
</table></td></tr>
<tr><td>Examination forms</td><td>Multiple-choice questions, short-answer questions</td></tr>
<tr><td>Study and examination requirements</td><td>Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.
Assignments/Examination: Students must have more than 50/100 points overall to pass this course.</td></tr>
<tr><td>Reading list</td><td>1. Craig Larman, Applying UML and Patterns - An introduction to Object-Oriented Analysis And Design 3rd, 2004</td></tr>
</table>

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-3) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO					
CLO	1	2	3	4	5	6
1	x					
2		x				
3					x	

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
1	Software development life cycle;	1	Midterm exam	Lecture, In-class activities	
2	Requirements gathering techniques;	1	Midterm exam	Lecture, In-class activities	

3	Analyze client's requirements;	1,3	Midterm exam, Assignment, Lab quiz	Lecture, In-class activities, Quiz	
4	Midterm				
5	Design and implementation the system;	2, 3	Final exam, Assignment, Lab quiz	Lecture, In-class activities, Quiz	
6	Design patterns;	2	Final exam	Lecture, In-class activities	
7	**Final exam**				

4. Assessment plan

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

Assessment Type	**CLO1**	**CLO2**	**CLO3**
Midterm examination (25%)	40%	25%	
Projects/Presentations/ Report (25%)	60%	30%	70%
Final examination (40%)		30%	10%
Exercises/ Quiz (10%)		15%	20%

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1. When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.↩

5. Rubrics (optional)

5.1. Grading checklist

Grading checklist for Written Reports			
Student: …….. Date: ……	HW/Assignment: ……. Evaluator: ……		
	Max.	**Score**	**Comments**
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		

Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)	10		
TOTAL SCORE	100		

5.2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	**Description**
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/ or	Issue/ problem to be considered critically is stated without clarification or description.

			backgrounds unknown.	
Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation / evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into	Specific position (perspective, thesis/hypothesis) takes into account the complexities of	Specific position (perspective, thesis/ hypothesis) acknowledges different	Specific position (perspective, thesis/ hypothesis) is stated, but is

	account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	sides of an issue.	simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequence s and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequence s and implications) are oversimplifie d.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable

	consistently observable and is skillful and makes the content of the presentation cohesive.	consistently observable within the presentation.	observable within the presentation.	within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities)

	authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022

Dean of School of Computer Science and Engineering

Assoc.Prof. Nguyen Van Sinh

Course Name: Principles of Programming Languages
Course Code: IT092IU

1. General information

Course designation	This course provides students the important principles of programming languages.
Semester(s) in which the course is taught	
Person responsible for the course	Dr. Ha Viet Uyen Synh
Language	English
Relation to curriculum	Compulsory (CS)
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	Total workload: 195 Contact hours: 45 (lecture) + 30 (laboratory) Private study including examination preparation, specified in hours: 120
Credit points	Number of credits : 4 Lecture: 3 Laboratory: 1
Required and recommended prerequisites for joining the course	
Course objectives	This course helps students: Learn important principles of programming languages; Learn basic components of programming languages; Learn programming language paradigms; Improve programming and software engineering skills
Course learning outcomes	CLO 1. Understand a wide range of programming paradigms CLO 2. Understand how different programming languages evolved CLO 3. Understand the differences in problem domains and language suitability CLO 4. Understand the basic features of programming language translation CLO 5. Understand implementation techniques for selected language constructs

Competency level	Course learning outcome (CLO)
Knowledge	1,2,3,4,5
Skill	2
Attitude	

<table>
<tr><td>Content</td><td>The description of the contents should clearly indicate the weighting of the content and the level.
Weight: lecture session (~~3~~ hours)
Teaching levels: I (Introduce); T (Teach); U (Utilize)
<table>
<tr><th>Topic</th><th>Weight</th><th>Level</th></tr>
<tr><td>Preliminaries</td><td>3</td><td>I,T</td></tr>
<tr><td>Evolution of the Major Programmin Languages</td><td>6</td><td>I,T</td></tr>
<tr><td>Functional Programming Languages</td><td>6</td><td>I,T</td></tr>
<tr><td>Software processes Describing Syntax and Semantics</td><td>3</td><td>I,T</td></tr>
<tr><td>Lexical and Syntax Analytics</td><td>3</td><td>I,T</td></tr>
<tr><td>Names, Bindings, Type Checking, and Scopes</td><td>3</td><td>I,T</td></tr>
<tr><td>Data Types</td><td>3</td><td>I,T</td></tr>
<tr><td>Expressions and Assignment Statement</td><td>3</td><td>I,T</td></tr>
<tr><td>Logic Programming Languages</td><td>6</td><td>I,T</td></tr>
<tr><td>Statement-Level Control Structures</td><td>3</td><td>I,T</td></tr>
<tr><td>Subprograms</td><td>3</td><td>I,T</td></tr>
<tr><td>Implement Subprograms</td><td>3</td><td>I,T</td></tr>
</table></td></tr>
<tr><td>Examination forms</td><td>Multiple-choice questions, short-answer questions</td></tr>
<tr><td>Study and examination requirements</td><td>Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.
Assignments/Examination: Students must have more than 50/100 points overall to pass this course.</td></tr>
<tr><td>Reading list</td><td>1. Robert W. Sebesta, Concepts of programming languages 10th, 2012
2. Terrence W.Pratt and Marvin V. Zelkowitz, Programming Languages - Design and Implementation 4th, 2011</td></tr>
</table>

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-5) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO					
CLO	1	2	3	4	5	6

1	x					
2		x				
3	x					
4	x					
5	x					

3. **Planned learning activities and teaching methods**

Week	Topic	CLO	Assessments	Learning activities	Resources
1	Preliminaries	1	Quiz,	lecture, exercises	
2	Evolution of the Major Programming Languages	2,3	Quiz,	lecture, exercises	
3	Functional Programming Languages	2,3	Quiz, Lab, Exam	lecture, exercises, lab	
4	Software processes Describing Syntax and Semantics	3,4,5	Quiz, Exam	lecture, exercises	
5	Lexical and Syntax Analytics	4,5	Quiz, Exam	lecture, exercises	
6	**Midterm**				
7	Names, Bindings, Type Checking, and Scopes	4,5	Quiz, Exam	lecture, exercises	
8	Data Types	4,5	Quiz, Exam	lecture, exercises	
9	Expressions and Assignment Statement	4,5	Quiz, Exam	lecture, exercises	
10	Logic Programming Languages	2,3	Quiz, Lab, Exam	lecture, exercises, lab	
11	Statement-Level Control Structures	4,5	Quiz, Exam	lecture, exercises	
12	Subprograms	4,5	Quiz, Exam	lecture, exercises	
13	Implement Subprograms	4,5	Quiz, Exam	lecture, exercises	
14	**Final exam**				

4. **Assessment plan**

Assessment Type	CLO1	CLO2	CLO3	CLO4	CLO5
Midterm examination (30%)	50%	50%	50%		
Final examination (40%)				50%	50%

Exercises/ Quiz (10%)	20%	20%	20%	20%	20%
Lab. Assignments (20%)	30%	30%	30%	30%	30%

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics (optional)

5.1. Grading checklist

Grading checklist for Written Reports			
Student: …….. Date: ……	HW/Assignment: ……. Evaluator: ……		
	Max.	**Score**	**Comments**
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)	10		
TOTAL SCORE	100		

5.2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	**Description**
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	Issue/ problem to be considered critically is stated without clarification or description.
Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation / evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others'	Identifies own and others' assumptions and several relevant contexts when	Questions some assumptions. Identifies several relevant	Shows an emerging awareness of present assumptions (sometimes

	assumptions and carefully evaluates the relevance of contexts when presenting a position.	presenting a position.	contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

	discussed in priority order.		implications) are identified clearly.	

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye	Delivery techniques (posture, gesture, eye	Delivery techniques (posture, gesture, eye	Delivery techniques (posture, gesture, eye contact, and

	contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022
Dean of School of Computer Science and Engineering

Assoc.Prof. Nguyen Van Sinh

Course Name: Mobile Application Development
Course Code: IT133IU

1. General information

Course designation	Advanced programming course with focus on mobile environment
Semester(s) in which the course is taught	
Person responsible for the course	MSc. Le Thanh Son
Language	English
Relation to curriculum	Elective (All programs)
Teaching methods	Lecture
Workload (incl. contact hours, self-study hours)	Total workload: 195 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 45 (lecture) + 30 (laboratory)

	Private study including examination preparation, specified in hours: 120
Credit points	Number of credits: 4 Lecture: 3 Laboratory: 1
Required and recommended prerequisites for joining the course	Object-oriented analysis and design
Course objectives	This course is designed to introduce and familiarize students with programming in the mobile environment: Android platform will be used throughout the course. The course starts with introductions to basic components, concepts, structures of Android applications then move on with common user interface elements, persistent storage, database for mobile etc. Introduction to most common tools and techniques for writing Android application is also included with hands on experience in form of lab exercise programming project.
Course learning outcomes	CLO 1. Understand the structure of mobile application, especially Android application CLO 2. Understand most common mobile platform user interface, database, services CLO 3. Able to develop mobile application CLO 4. Team working

Competency level	Course learning outcome (CLO)
Knowledge	1
Skill	2, 3
Attitude	4

Content

The description of the contents should clearly indicate the weighting of the content and the level.
Weight: lecture session (~~3~~ hours)
Teaching levels: I (Introduce); T (Teach); U (Utilize)

Topic	Weight	Level
Introduction to mobile programming	3	I
Android and Modal View Controller	3	I, T
Activity Lifecycle	3	I, T
Adroid SDK Versions and Compatbility	3	I, T
Creating UI: Layout and Widgets	3	T, U
ListFragment	3	
ViewPager	3	T, U
Dialogs	3	T, U
MediaPlayer	3	T, U

	Action Bar	3	T, U
	Saving and Loading Local Files	3	T, U
	Context Menu and Contextual Action Mode	3	T, U
	Taking Pictures and Handling Images	3	T, U
	Intents	3	T, U
	Browsing the Web & WebView	3	T, U
Examination forms	Multiple-choice questions, short-answer questions		
Study and examination requirements	Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. Assignments/Examination: Students must have more than 50/100 points overall to pass this course.		
Reading list	1. C. Stewart, K. Marscicano, Android Programming: The Big Nerd Ranch Guide 3rd, 2017 2. D. Griffiths, Head First Android Development: A Brain-Friendly Guide 1st, 2015		

1. **Learning Outcomes Matrix**

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

CLO\SLO	1	2	3	4	5	6
1	x					
2	x					
3		xx				xxx
4			x			xxx

2. **Planned learning activities and teaching methods**

Week	**Topic**	**CLO**	**Assessments**	**Learning activities**	**Resources**
1	Introduction to mobile programming	1	Quiz	Lecture	2
2	Android and Modal View Controller	1	Quiz	Lecture	2
3	Activity Lifecycle	1	Quiz	Lecture	2
4	Adroid SDK Versions and Compatbility	1	Quiz, Lab, Midterm	Lecture, Discussion	2

5	Creating UI: Layout and Widgets	2, 3, 4	Quiz, Lab, Midterm	Lecture, Discussion, In-class Exercise	1
6	ListFragment	2, 3, 4	Quiz, Lab, Midterm	Lecture, Discussion, In-class Exercise	1
7	ViewPager	2, 3, 4	Quiz, Lab, Midterm	Lecture, Discussion, In-class Exercise	1
8	Dialogs	2, 3, 4	Quiz, Lab, Midterm	Lecture, Discussion, In-class Exercise	1
	Midterm				
9	MediaPlayer	2, 3, 4	Quiz, Lab, Final	Lecture, Discussion, In-class Exercise	1
10	Action Bar	2, 3, 4	Quiz, Lab, Final	Lecture, Discussion, In-class Exercise	1
11	Saving and Loading Local Files	2, 3, 4	Quiz, Lab, Final	Lecture, Discussion, In-class Exercise	1
12	Context Menu and Contextual Action Mode	2, 3, 4	Quiz, Lab, Final	Lecture, Discussion, In-class Exercise	1
13	Taking Pictures and Handling Images	2, 3, 4	Quiz, Lab, Final	Lecture, Discussion, In-class Exercise	1
14	Intents	2, 3, 4	Quiz, Lab, Final	Lecture, Discussion, In-class Exercise	1
15	Browsing the Web & WebView	2, 3, 4	Quiz, Lab, Final	Lecture, Discussion, In-class Exercise	1
	Final exam				

3. **Assessment plan**

Assessment Type	**CLO1**	**CLO2**	**CLO3**	**CLO4**
Quiz / Assigment (10%)	50%	10%	10%	70%
Labs (20%)	10%	30%	30%	30%
Midterm examination (30%)	30%	30%	30%	
Final examination (40%)	10%	30%	30%	

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

4. Rubrics (optional)

5.1. Grading checklist

Grading checklist for Written Reports			
Student: …….. Date: ……	HW/Assignment: ……. Evaluator: ……		
	Max.	**Score**	**Comments**
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)	10		
TOTAL SCORE	100		

5.2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	**Description**
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	Issue/ problem to be considered critically is stated without clarification or description.
Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation / evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions).

	relevance of contexts when presenting a position.		position. May be more aware of others' assumptions than one's own (or vice versa).	Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	Milestone		Benchmark
	4	3	2	1
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling,	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable,	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and

	and speaker appears polished and confident.	speaker appears comfortable.	and speaker appears tentative.	speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022

Dean of School of Computer Science and Engineering

Assoc.Prof. Nguyen Van Sinh

Course Name: Optimization and Applications
Course Code: IT163IU

1. General information

Course designation	This subject covers linear programming, convex optimization theory, and applications.
Semester(s) in which the course is taught	
Person responsible for the course	Assoc. Prof. Vo Thi Luu Phuong, Ph.D.
Language	English
Relation to curriculum	Elective
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: 195 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 45 (lecture) + 30 (laboratory) Private study including examination preparation, specified in hours: 120.
Credit points	Number of credits: 4 Lecture: 3 Laboratory: 1
Required and recommended	

<table>
<tr><td>prerequisites for joining the course</td><td></td></tr>
<tr><td>Course objectives</td><td>Optimization, particularly convex optimization, is applied in many fields such as data science, computer science, economics, engineering, logistics, etc. Optimization models of various applications in machine learning, resource allocations, etc. are introduced. Background theory of iterative algorithms solving problems such as gradient descent, mini-batch stochastic gradient descent, subgradient method, proximal gradient descent, etc. are taught.
The course also covers linear programming (LP) which is a subfield of convex optimization. Some LP applications such as max flow – min cut, transportation, shortest path,… problems are mentioned.</td></tr>
<tr><td>Course learning outcomes</td><td>CLO 1. Formulate a practical problem as an optimization model and solve it using optimization solvers.
CLO 2. Understand the background theory of convex problem, duality, and iterative algorithms solving the problems.
CLO 3. Be able to develop computer programs that applied iterative algorithms such as gradient descent, stochastic gradient descent, proximal gradient descent, subgradient method, … to solve optimization problems in various applications.
<table>
<tr><th>Competency level</th><th>Course learning outcome (CLO)</th></tr>
<tr><td>Knowledge</td><td>CLO1, CLO2</td></tr>
<tr><td>Skill</td><td>CLO3</td></tr>
<tr><td>Attitude</td><td></td></tr>
</table></td></tr>
<tr><td>Content</td><td>The description of the contents should clearly indicate the weighting of the content and the level.
Weight: lecture session (hours)
Teaching levels: I (Introduce); T (Teach); U (Utilize)
<table>
<tr><th>Topic</th><th>Weight</th><th>Level</th></tr>
<tr><td>Course introduction
Mathematical background (linear algebra and calculus)</td><td>1</td><td>I, T</td></tr>
<tr><td>Linear program and applications</td><td>2</td><td>I, T, U</td></tr>
<tr><td>Integer linear program and its applications</td><td>1</td><td>I, T</td></tr>
<tr><td>Convex sets and convex functions</td><td>1</td><td>I, T</td></tr>
<tr><td>Convex problems.</td><td>1</td><td>I, T, U</td></tr>
</table></td></tr>
</table>

	Some applications: - Linear regression - Classification - Regularization: Ridge regression, Lasso regression	1	I, T, U
	First-order methods: - gradient descent - subgradient - stochastic gradient - proximal gradient	2	I, T, U
	Duality - Lagrange, duality gap - KKT condition - Dual problem	2	I, T
	Dual-based methods: - Dual decomposition - Dual of support vector machine problem	1	I, U, T
	Second-order methods: - Newton method - Log-barrier method	1	I, U, T
	Advanced topic in optimization	1	I, U
	Final review	1	U
Examination forms	Multiple-choice questions, short-answer questions, programming		
Study and examination requirements	Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. Assignments/Examination: Students must have more than 50/100 points overall to pass this course.		
Reading list	1. Stephen P. Boyd and Lieven Vandenberghe. Convex optimization. Cambridge university press, 2004. 2. Robert J. Vanderbei. Linear programming: foundations and extensions, 5th edition. Springer Nature, 2020.		

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO					
CLO	1	2	3	4	5	6
1		XX				

2	XX					
3						X

3. Planned learning activities and teaching methods

Week	**Topic**	**CLO**	**Assessments**	**Learning activities**	**Resources**
1	Course introduction	2		lecture	1, 2
2	Mathematical background (linear algebra and calculus)	2		lecture	1
3-4	Linear program and applications	1, 2	Midterm, homework, lab	lecture, exercises, lab	2
5	Integer linear program and its applications	1, 2	Midterm, homework	lecture, exercises	2
6	Convex sets and convex functions	1, 2	Midterm, homework	lecture, exercises	1
7	Some applications: - Linear regression - Classification - Regularization: Ridge regression, Lasso regression	1	Midterm, homework, lab	lecture, exercises, lab	1, 2
	Midterm				
8-10	First-order methods: - gradient descent - subgradient - stochastic gradient - proximal gradient	2, 3	Final, homework, lab	lecture, exercises, lab	1
11	Duality - Lagrange, duality gap - KKT condition - Dual problem	2	Final, homework	lecture, exercises	1
12	Dual-based methods: - Dual decomposition - Dual of support vector machine problem	2, 3	Final, homework, lab	lecture, exercises, lab	1
13	Second-order methods: - Newton method - Log-barrier method	2, 3	Final, homework, lab	lecture, exercises, lab	1

14	Advanced topic in optimization	2	Final, homework	lecture, exercises	Literature
15	Final review	1		lecture	
14	**Final exam**				

4. Assessment plan

Assessment Type	**CLO 1**	**CLO 2**	**CLO 3**
Labs (25%)	25%		50%
Midterm examination (30%)	25%	40%	
Final examination (35%)	25%	40%	25%
Homeworks (10%)	25%	20%	25%

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

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1. When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.↩

5. Rubrics (optional)

5.1. Grading checklist

Grading checklist for Written Reports			
Student: …… HW/Assignment: ……. Date: …… Evaluator: ……			
	Max.	**Score**	**Comments**
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		
Presentation (20%)			

Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)	10		
TOTAL SCORE	100		

5.2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	**Description**
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	Issue/ problem to be considered critically is stated without clarification or description.

Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation/ evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.

	(perspective, thesis/ hypothesis).			
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.

Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/

	presenter's credibility/ authority on the topic.	authority on the topic.	authority on the topic.	authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022

Dean of School of Computer Science and Engineering

Nguyen Van Sinh

Course Name: Fundamental Concepts of Data Security
Course Code: IT140IU

1. General information

1. Course designation	Fundamental concept of data security: This course focuses on information security, integrity and privacy techniques.
Semester(s) in which the course is taught	
Person responsible for the course	Le Thanh Son, MSc.
Language	English
Relation to curriculum	Compulsory
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: 195 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 45 (lecture) + 30 (laboratory) Private study including examination preparation, specified in hours: 120 Student responsibility: Students are expected to spend at least 8 hours per week for self – studying. This time should be made up of reading, working on exercises and problems and group assignment.
Credit points	Number of credits : 4 Lecture: 3 Laboratory: 1
Required and recommended prerequisites for joining the course	
Course objectives	This course introduces students to cryptographic principals and systems (symmetric and public key encryptions), and their applications in data security, secure communications, authentication and authorization. These core principles will be applied to the concepts of information risk management, and the analysis and handling of compromised systems. The ethics around computer crime, privacy, and intellectual property are covered in detail. Finally, the unit will cover the criteria and controls for information classification.
Course learning outcomes	CLO 1. Gain understanding of the cryptography concepts including symmetric key encryption, hash function, message

<table>
<tr><td></td><td>authentication code, public key encryption, digital signature and digital envelope;
CLO 2. Apply the concepts of authentication and authorization in implementing secure systems and networks;
CLO 3. Understand and categorize the malicious software and their attacking mechanisms;
CLO 4. Explore the buffer overflow attacks and fuzzing to find software vulnerabilities, and obtain the knowledge of software and operating system security;
CLO 5. Understand and practice Internet security protocols and authentication applications;
<table>
<tr><th>Competency level</th><th>Course learning outcome (CLO)</th></tr>
<tr><td>Knowledge</td><td>CLO1, CLO2, CLO3, CLO5</td></tr>
<tr><td>Skill</td><td>CLO4</td></tr>
<tr><td>Attitude</td><td></td></tr>
</table></td></tr>
<tr><td>Content</td><td>The description of the contents should clearly indicate the weighting of the content and the level.
Weight: lecture session (~~3~~ hours)
Teaching levels: I (Introduce); T (Teach); U (Utilize)
<table>
<tr><th>Topic</th><th>Weight</th><th>Level</th></tr>
<tr><td>Symmetric-key encipherment (AES, DES)</td><td>2</td><td>T,U</td></tr>
<tr><td>Asymmetric-key encipherment (RSA, Diffie-Hellman,…);</td><td>2</td><td>T,U</td></tr>
<tr><td>Message integrity and message authentication;</td><td>2</td><td>T,U</td></tr>
<tr><td>Cryptographic hash function;</td><td>1</td><td>T,U</td></tr>
<tr><td>Digital signature;</td><td>1</td><td>T,U</td></tr>
<tr><td>Entity authentication;</td><td>1</td><td>T,U</td></tr>
<tr><td>Security at the application layer: PGP and S/MINE;</td><td>1</td><td>T</td></tr>
<tr><td>Security at the transport layer: SSL and TLS;</td><td>1</td><td>T</td></tr>
<tr><td>Security at network layer: IPSec;</td><td>1</td><td>T</td></tr>
<tr><td>Malicious software;</td><td>2</td><td>T</td></tr>
<tr><td>Database and cloud security;</td><td>1</td><td>T,U</td></tr>
</table></td></tr>
<tr><td>Examination forms</td><td>Multiple-choice questions, short-answer questions</td></tr>
<tr><td>Study and examination requirements</td><td>Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.</td></tr>
</table>

	Assignments/Examination: Students must have more than 50/100 points overall to pass this course.
Reading list	1. William Stallings, Cryptography and Network Security 7th, 2016

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-5) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO					
CLO	1	2	3	4	5	6
1	X		X	X		
2		X				
3	X					
4	X					
5	X					

3. Planned learning activities and teaching methods

Week	**Topic**	**CLO**	**Assessments**	**Learning activities**	**Resources**
1	Symmetric-key encipherment (AES, DES)	1	Quiz, exam	Lecture, exercises, lab	[1]
2	Asymmetric-key encipherment (RSA, Diffie-Hellman,…);	1	Quiz, exam	Lecture, exercises, lab	[1]
3	Message integrity and message authentication;	1,2	Quiz, exam	Lecture, exercises, lab	[1]
4	Cryptographic hash function;	1	Quiz, exam	Lecture, exercises, lab	[1]
5	Digital signature;	1	Quiz, exam	Lecture, exercises, lab	[1]
6	**Midterm**				
7	Entity authentication;	2	Quiz, exam	Lecture, exercises, lab	[1]

8	Security at the application layer: PGP and S/MINE;	5	Quiz, exam	Lecture, exercises	[1]
9	Security at the transport layer: SSL and TLS;	5	Quiz, exam	Lecture, exercises	[1]
10	Security at network layer: IPSec;	5	Quiz, exam	Lecture, exercises	[1]
11	Malicious software;	3,4	Quiz, exam	Lecture, exercises, lab	[1]
12	Database and cloud security;	3,4	Quiz, exam	Lecture, exercises, lab	[1]
13	**Final exam**				

4. **Assessment plan**

Assessment Type	**CLO 1**	**CLO 2**	**CLO 3**	**CLO 4**	**CLO 5**
Midterm examination (30%)	68%	70%	55%		
Final examination (40%)				74%	67%
Exercises/ Quiz (30%)	32%	30%	45%	26%	33%

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

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1. When calculating contact time, each contact hour is counted as a full hour because the organization of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.↩

5. Rubrics (optional)

5.1. Grading checklist

Grading checklist for Written Reports			
Student: …… HW/Assignment: ……. Date: …… Evaluator: ……			
	Max.	**Score**	**Comments**
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		

Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)	10		
TOTAL SCORE	100		

5.2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	**Description**
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously	Issue/ problem to be considered critically is stated but description leaves some terms undefined,	Issue/ problem to be considered critically is stated without clarification or description.

	necessary for full understanding.	impeded by omissions.	ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	
Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation/ evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others'	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.

	(perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	points of view are acknowledged within position (perspective, thesis/ hypothesis).		
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.

Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandabilit y of the presentation, and speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/

	presenter's credibility/ authority on the topic.	authority on the topic.	authority on the topic.	authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022

Dean of School of Computer Science and Engineering

Nguyen Van Sinh

Course Name: Decision support systems
Course Code: IT145IU

1. General information

Course designation	Introduction to the decision support system (DSS), an interactive computer-based system (or subsystem) intended to help decision makers. DSS simulate cognitive decision-making functions of humans based on AI methods including the area of knowledge: Expert systems, Data mining, Machine learning, Connectionism, Logical reasoning.
Semester(s) in which the course is taught	__semester__
Person responsible for the course	Nguyen Van Sinh, Assoc.Prof.
Language	English
Relation to curriculum	Compulsory / elective / specialisation Names of other study programmes with which the module is shared
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: Contact hours (please specify whether lecture, exercise, laboratory session, etc.): Private study including examination preparation, specified in hours: Student responsibility: Students are expected to spend at least 8 hours per week for self – studying. This time should be made up of reading, working on exercises and problems and group assignments.
Credit points	Number of credits : 4 Lecture: 3 Laboratory: 1
Required and recommended prerequisites for joining the course	Object-Oriented Programming
Course objectives	A Decision Support System (DSS) is an interactive computer-based system or subsystem intended to help decision makers use communications technologies, data, documents, knowledge and/or models to identify and solve problems, complete decision process tasks, and make decisions. DSS simulate cognitive decision-making functions of humans based on artificial intelligence methodologies (including expert systems, data mining, machine learning, connectionism, logistical reasoning, etc.) in order to perform decision support functions. DSS

	is a general term for any computer application that enhances a person or group's ability to make decisions. Also, DSS refers to an academic field of research that involves designing and studying DSS in their context of use.
Course learning outcomes	CLO 1. Understand the goals and different forms of decision support, and gain knowledge of the practical issues of implementation CLO 2. Examine systems based on statistical and logical approaches to decision making that include statistical prediction, rule-based systems, case-based reasoning, neural networks, fuzzy logic, etc. CLO 3. Obtain an overview of the various computerized decision support techniques together with a detailed assessment of successful and unsuccessful applications developed CLO 4. Examine the actual and potential impact of the technology together with the challenges associated with this kind of application

etency level	**Course learning outcome (C**
edge	
e	

Content	*The description of the contents should clearly indicate the weighting of the content and the level.* Weight: lecture session (~~3~~ hours) Teaching levels: I (Introduce); T (Teach); U (Utilize)		
		Weight	**Level**
	Introduction to Decision Making and Decision Support	3	I, U
	Models, Cognitive Tools and Decision Making	3	I, T, U
	Decision support systems	3	I, T, U
	Modeling and analysis	3	I, T, U
	Data warehousing, Data Acquisition, Data Mining, Business analysis, and visualization	3	I, T, U
	Decision support system development	3	I, T, U
	Collaborative computing technologies: Group support systems	3	I, T, U

		Review for Midterm Exam	3	U	
		Enterprise Information Systems	3	I, T, U	
		Knowledge management	3	I, T, U	
		Artificial intelligent & Expert systems: Knowledge-Based systems	3	I, T, U	
		Knowledge Acquisition, Representation and Reasoning	3	I, T, U	
		Advanced Intelligent Systems	3	I, T, U	
		Ecommerce applications	3	I, T, U	
		Review for final exam	3	U	
Examination forms		Multiple-choice questions, short-answer questions			
Study and examination requirements		Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. Assignments/Examination: Students must have more than 50/100 points overall to pass this course.			
Reading list					

2. **Learning Outcomes Matrix (optional)**

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO					
CLO	1	2	3	4	5	6
1	x					
2		x				
3		x				
4				x		

3. **Planned learning activities and teaching methods**

Week	**Topic**	**CLO**	**Assessments**	**Learning activities**	**Resources**
1	Introduction to Decision Making and Decision Support	1			

Week	Topic	CLO	Assessments	Learning activities	Resources
2	Models, Cognitive Tools and Decision Making	2,3			
3	Decision support systems	2,3			
4	Modeling and analysis	2,3,4			
5	Data warehousing, Data Acquisition, Data Mining, Business analysis, and visualization	2,3,4			
6	**Midterm**				
7	Decision support system development	2,3,4			
8	Collaborative computing technologies: Group support systems	2,3,4			
9	Enterprise Information Systems	2,3,4			

Week	Topic	CLO	Assessments	Learning activities	Resources
10	Knowledge management	2,3,4			
11	Artificial intelligent & Expert systems: Knowledge-Based systems	2,3,4			
12	Knowledge Acquisition, Representation and Reasoning	2,3,4			
13	Advanced Intelligent Systems	2,3,4			
14	Ecommerce applications	2,3,4			
15	**Final exam**				

4. **Assessment plan**

Assessment Type	CLO1	CLO2	CLO3	CLO4
Labs (25%)	x	x	x	x
Midterm examination (30%)	x	x		
Final examination (40%)		x	x	x
Exercises/ Quiz (10%)	x	x	x	x

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

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1. When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.↩

5. Rubrics (optional)

5.1. Grading checklist

Grading checklist for Written Reports			
Student: …… HW/Assignment: ……. Date: …… Evaluator: ……			
	Max.	**Score**	**Comments**
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)	10		
TOTAL SCORE	100		

5.2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	**Description**
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.

2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	Issue/ problem to be considered critically is stated without clarification or description.
Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation/ evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.

Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.

Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022

Dean of School of Computer Science and Engineering

Nguyen Van Sinh

Course Name: Cloud Computing
Course Code: IT164IU

1. **General information**

Course designation	The course presents a top-down view of cloud computing, from applications and administration to programming and infrastructure.
Semester(s) in which the course is taught	
Person responsible for the course	Dr. Le Duy Tan
Language	English
Relation to curriculum	Elective (CS, NE, CE)
Teaching methods	Lecture
Workload (incl. contact hours, self-study hours)	Total workload: 182.5 hours Contact hours (please specify whether lecture, exercise, laboratory session, etc.): Lecture: 37.5 hours + Laboratory: 25 hours. Private study including examination preparation, specified in hours: 120 hours.
Credit points	Number of credits: 4 Lecture: 3 Laboratory: 1
Required and recommended prerequisites for joining the course	Computer Networks
Course objectives	This course concentrates on parallel programming techniques for cloud computing and large-scale distributed systems which form the cloud infrastructure. The topics include overview of cloud computing, cloud systems, parallel processing in the cloud, distributed storage systems, virtualization, security in the cloud, and multicore operating systems. Students will study state-of-the-art solutions for cloud computing developed by Google, Amazon, Microsoft, Yahoo, VMWare, etc. Students will also apply what they learn in one programming assignment and one project executed over Amazon Web Services.
Course learning outcomes	CLO 1. Analyze the trade-offs between deploying applications in the cloud and over the local infrastructure.

<table>
<tr><td></td><td>CLO 2. Able to deploy applications over commercial cloud computing infrastructures such as Amazon Web Services, Windows Azure, and Google AppEngine.
CLO 3. Solve a real-world problem using cloud computing through group collaboration.

<table>
<tr><th>Competency level</th><th>Course learning outcome (CLO)</th></tr>
<tr><td>Knowledge</td><td>1</td></tr>
<tr><td>Skill</td><td>2, 3</td></tr>
<tr><td>Attitude</td><td>3</td></tr>
</table></td></tr>
<tr><td>Content</td><td>The description of the contents should clearly indicate the weighting of the content and the level.
Weight: lecture session (3 hours)
Teaching levels: I (Introduce); T (Teach); U (Utilize)
<table>
<tr><th>Topic</th><th>Weight</th><th>Level</th></tr>
<tr><td>Introduction to Cloud Computing</td><td>1</td><td>I</td></tr>
<tr><td>Cloud Computing Platforms</td><td>3</td><td>T</td></tr>
<tr><td>Parallel Programming in the Cloud</td><td>3</td><td>T, U</td></tr>
<tr><td>Distributed Storage Systems</td><td>3</td><td>T, U</td></tr>
<tr><td>Virtualization</td><td>2</td><td>T, U</td></tr>
<tr><td>Cloud Security</td><td>2</td><td>T</td></tr>
<tr><td>Multicore Operating Systems</td><td>1</td><td>T</td></tr>
</table></td></tr>
<tr><td>Examination forms</td><td>Short-answer questions, Programming exercises</td></tr>
<tr><td>Study and examination requirements</td><td>Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.
Assignments/Examination: Students must have more than 50/100 points overall to pass this course.</td></tr>
<tr><td>Reading list</td><td>4. Rountree, Derrick, and Ileana Castrillo. The basics of cloud computing: Understanding the fundamentals of cloud computing in theory and practice. Newnes, 2013.
5. Patterson, Scott. Learn AWS Serverless Computing: A Beginner's Guide to Using AWS Lambda, Amazon API Gateway, and Services from Amazon Web Services. Packt Publishing Ltd, 2019.</td></tr>
</table>

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

CLO\SLOT	1	2	3	4	5	6
1	X					
2		XX				
3						X

3. **Planned learning activities and teaching methods**

Week	**Topic**	**CLO**	**Assessments**	**Learning activities**	**Resources**
1	Introduction to Cloud Computing	1	Quiz	Lecture	1
2	Cloud Computing Platforms – Part 1	1	Quiz	Lecture	1
3	Cloud Computing Platforms – Part 2	1	Quiz	Lecture, Discussion, In-class Exercise	2
4	Cloud Computing Platforms – Part 3	2, 3	Quiz, Lab, Midterm	Lecture, Discussion, In-class Exercise	1
5	Parallel Programming in the Cloud – Part 1	2, 3	Quiz, Lab, Midterm	Lecture, Discussion, In-class Exercise	1
6	Parallel Programming in the Cloud – Part 2	2, 3	Quiz, Lab, Midterm	Lecture, Discussion, In-class Exercise	2
7	Parallel Programming in the Cloud – Part 3	2, 3	Quiz, Lab, Midterm	Lecture, Discussion, In-class Exercise	1
8	Distributed Storage Systems – Part 1	2, 3	Quiz, Lab, Midterm	Lecture, Discussion, In-class Exercise	1
Midterm					
9	Distributed Storage Systems – Part 2	2, 3	Quiz, Lab, Final	Lecture, Discussion, In-class Exercise	1
10	Distributed Storage Systems – Part 3	2, 3	Quiz, Lab, Final	Lecture, Discussion	1

				, In-class Exercise	
11	Virtualization – Part 1	2, 3	Quiz, Lab, Final	Lecture, Discussion , In-class Exercise	1
12	Virtualization – Part 2	2, 3	Quiz, Lab, Final	Lecture, Discussion , In-class Exercise	1
13	Cloud Security – Part 1	2, 3	Quiz, Lab, Final	Lecture, Discussion , In-class Exercise	1, 2
14	Cloud Security – Part 2	2, 3	Quiz, Lab, Final	Lecture, Discussion , In-class Exercise	1
15	Multicore Operating Systems	2, 3	Quiz, Lab, Final	Lecture, Discussion , In-class Exercise	1
Final					

4. **Assessment plan**

Assessment Type	**CLO1**	**CLO2**	**CLO3**
Quiz / Assigment (10%)	50%	10%	10%
Labs (20%)	10%	30%	30%
Midterm examination (30%)	30%	30%	30%
Final examination (40%)	10%	30%	30%

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics (optional)

5.1. Grading checklist

Grading checklist for Written Reports			
Student: …… Date: ……	HW/Assignment: ……. Evaluator: ……		
	Max.	**Score**	**Comments**
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		

Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)	10		
TOTAL SCORE	100		

5.2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	**Description**
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously	Issue/ problem to be considered critically is stated but description leaves some terms	Issue/ problem to be considered critically is stated without clarification or description.

	information necessary for full understanding.	impeded by omissions.	undefined, ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	
Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation/ evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others'	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.

hypothesis)	(perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	points of view are acknowledged within position (perspective, thesis/ hypothesis).		
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.

Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.

	presenter's credibility/ authority on the topic.	authority on the topic.	authority on the topic.	
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: August 28, 2023

Ho Chi Minh City, 28/08/2023

Dean of School of Computer Science and Engineering

Assoc.Prof. Nguyen Van Sinh

Course Name: Business Process Analysis
Course Code: IT144IU

1. General information

Course designation	The course aims to provide fundamental knowledge of business process analysis, improvement and evaluation.
Semester(s) in which the course is	
Person responsible for the course	Assof. Pror.Dr. Vo Thi Luu Phuong
Language	English
Relation to curriculum	Elective
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	Total workload: Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 195 hours. Lecture: 45 hours. Lab: 30 hours. Private study including examination preparation, specified in hours: 120 hours. Student responsibility: Students are expected to spend at least 8 hours per week for self – studying. This time should be made up of reading, working on exercises and problems and group assignment.
Credit points	Number of credits : 4 Lecture: 3 Laboratory: 1
Required and recommended prerequisites for joining the course	None
Course objectives	Every organization thrives to implement effective business processes to increase employee and customer satisfaction, enhance business performance, reduce costs and boost productivity. All activities including altering critical processes, merging or splitting business units require a consistent framework to manage the changes. The course aims to provide fundamental knowledge of business process analysis, improvement and evaluation. Various approaches, techniques and software tools used to analyze and manage business process improvement are also introduced in the course.
Course learning outcomes	CLO 1. Practice the Framework for Process Improvement CLO 2. Identify and analyze an organization's business process using different techniques such as ANSI, Swim

<table>
<tr><td></td><td>Lane, Business Process Diagrams, UML, SIPOC, and Value Stream Maps
CLO 3. Evaluate process improvement effectiveness

<table><tr><th>Competency level</th><th>Course learning outcome (CLO)</th></tr><tr><td>Knowledge</td><td>1, 2, 3</td></tr><tr><td>Skill</td><td>1, 3</td></tr><tr><td>Attitude</td><td></td></tr></table></td></tr>
<tr><td>Content</td><td>The description of the contents should clearly indicate the weighting of the content and the level.
Weight: lecture session (3 hours)
Teaching levels: I (Introduce); T (Teach); U (Utilize)<table><tr><th></th><th>Weight</th><th>Level</th></tr><tr><td>cience in Action</td><td>1</td><td>I</td></tr><tr><td>s Models and
s Discovery</td><td>3</td><td>T, U</td></tr><tr><td>nt Types of
s Models</td><td>4</td><td>T,U</td></tr><tr><td>s Discovery
ques and
mance
ng</td><td>3</td><td>T,U</td></tr><tr><td>ment of Process
s</td><td>3</td><td>T,U</td></tr><tr><td>ional Support
nclusions</td><td>1</td><td>I</td></tr></table></td></tr>
<tr><td>Examination forms</td><td>Multiple-choice questions, short-answer questions</td></tr>
<tr><td>Study and examination requirements</td><td>Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.
Assignments/Examination: Students must have more than 50/100 points overall to pass this course.</td></tr>
<tr><td>Reading list</td><td></td></tr>
</table>

2. **Learning Outcomes Matrix (optional)**

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO					
CLO	1	2	3	4	5	6
1		X			X	
2		X				
3		X	X			

3. **Planned learning activities and teaching methods**

Week	**Topic**	**CLO**	**Assessments**	**Learning activities**	**Resources**
1	Data Science in Action	2	Midterm	In-class activities	
2	Process Models and Process Discovery	2, 5	Midterm, Quiz, Project, Lab	In-class activities, quiz	
3	**Midterm**				
4	Different Types of Process Models	2	Final, Project, Lab	In-class activities	
5	Process Discovery Techniques and Conformance Checking	2, 3	Final, Project, Quiz, Lab	In-class activities, Quiz	
6	Enrichment of Process Models	2	Final, Project, Lab	In-class activities	
7	Operational Support and Conclusions	2	Final, Project, Lab	In-class activities	
8	**Final exam**				

4. **Assessment plan**

Assessment Type	**CLO1**	**CLO2**	**CLO3**
Labs (20%)	20%	20%	
Midterm examination (30%)	50%	40%	
Final examination (40%)		20%	60%
Exercises/ Quiz/ Project (10%)	30%	20%	40%

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

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1. When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.↩

5. Rubrics (optional)

5.1. Grading checklist

Grading checklist for Written Reports			
Student: …… HW/Assignment: ……. Date: …… Evaluator: ……			
	Max.	**Score**	**Comments**
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		

Quality of Layout and Graphics (10%)	10		
TOTAL SCORE	100		

5.2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	**Description**
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	Issue/ problem to be considered critically is stated without clarification or description.
Evidence *Selecting and using information to investigate a point of*	Information is taken from source(s) with enough interpretation/ evaluation to develop a	Information is taken from source(s) with enough interpretation/ evaluation to develop a	Information is taken from source(s) with some interpretation/ evaluation, but not enough to	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of

view or conclusion	comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.
Conclusions and related outcomes (implications and	Conclusions and related outcomes (consequences and implications) are logical and reflect	Conclusion is logically tied to a range of information, including	Conclusion is logically tied to information (because information is	Conclusion is inconsistently tied to some of the information

consequences)	student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	discussed; related outcomes (consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	**Milestone**		**Benchmark**
	4	**3**	**2**	**1**
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.

Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandabilit y of the presentation, and speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022

Dean of School of Computer Science and Engineering

Nguyen Van Sinh

Course Name: Critical Thinking
Course Code: **PE008IU**

1. General information

Course designation	*This course provides the nature and techniques of thought as a basis for our claims, beliefs, and attitudes about the world. The course also explores the process in which people develop their claims and support their beliefs.* *Specifically, the course includes the theory and practice of presenting arguments in oral and written forms, making deductive and inductive arguments, evaluating the validity or strength of arguments, detecting fallacies in arguments, and refuting fallacious arguments.* *Resources for the reasoning process include hypothetical and real-life situations in various fields of natural sciences, social sciences, and humanities.*
Semester(s) in which the course is taught	1, 2, 3
Person responsible for the course	Trần Thanh Tú (Ph.D) Nguyễn Thị Thủy (Ph.D) Phạm Ngọc (Ph.D) Nguyễn Văn Tiếp (Ph.D) Vũ Tiến Thịnh (MA) Đỗ Thị Diệu Ngọc (MA)
Language	English
Relation to curriculum	Compulsory
Teaching methods	Lectures, discussions, homework assignments, students' presentations
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: 135 Contact hours (lecture, exercise): 45 Private study including examination preparation, specified in hours: 90
Credit points	3

<table>
<tr><td>Required and recommended prerequisites for joining the course</td><td>None</td></tr>
<tr><td>Course objectives</td><td>his course will enable students to
develop the habits of assessing and defending the reasonableness of their beliefs and values as well as those of others
appreciate the importance of looking at an issue from a variety of perspectives
apply critical thinking skills in both public and personal settings</td></tr>
<tr><td>Course learning outcomes</td><td>Upon the successful completion of this course, students will be able to:
<table>
<tr><th>Competency level</th><th>Course learning outcome (CLO)</th></tr>
<tr><td>Knowledge</td><td>CLO1. Know the general concepts and standards of critical thinking; and comprehend the disadvantages of barriers to critical thinking in various contexts
CLO2. Know the elements of an argument and two patterns of reasoning
CLO3 Know the fallacies of relevance and insufficient evidence in arguments</td></tr>
<tr><td>Skill</td><td>CLO4. Construct and evaluate deductive and inductive arguments in spoken and written forms
CLO5. Test the validity of deductive arguments using Venn diagram and truth tables
CLO6. Analyze and standardize arguments
CLO7. Evaluate truth claims and refute arguments
CLO8. Analyze weaknesses in inductive arguments to strengthen them</td></tr>
<tr><td>Attitude</td><td>CLO9. Defend personal/group beliefs with good arguments and in appropriate manners (project presentations)</td></tr>
</table></td></tr>
</table>

<table>
<tr><td>Content</td><td>

The description of the contents should clearly indicate the weighting of the content and the level.

Weight: lecture session (2 hours)

Teaching levels: I (Introduce); T (Teach); U (Utilize)

<table>
<tr><th>Topic</th><th>Weight</th><th>Level</th></tr>
<tr><td>Introduction to Critical thinking</td><td>3</td><td>I, T, U</td></tr>
<tr><td>Recognizing arguments</td><td>3</td><td>T, U</td></tr>
<tr><td>Basic logical concepts</td><td>3</td><td>T, U</td></tr>
<tr><td>A little categorical logic</td><td>3</td><td>T, U</td></tr>
<tr><td>A little propositional logic</td><td>3</td><td>T, U</td></tr>
<tr><td>Logical fallacies I</td><td>3</td><td>T, U</td></tr>
<tr><td>Logical fallacies II</td><td>3</td><td>T, U</td></tr>
<tr><td>Review for Midterm test</td><td>3</td><td>U</td></tr>
<tr><td>Analyzing arguments</td><td>3</td><td>T, U</td></tr>
<tr><td>Evaluating arguments and truth claims</td><td>3</td><td>T, U</td></tr>
<tr><td>Inductive reasoning</td><td>3</td><td>T, U</td></tr>
<tr><td>Project: Group presentation</td><td>9</td><td>U</td></tr>
<tr><td>Review for Final Exam</td><td>3</td><td>U</td></tr>
</table>

</td></tr>
<tr><td>Examination forms</td><td>40 multiple-choice questions for the midterm and final exams and group presentations for the final project</td></tr>
<tr><td>Study and examination requirements</td><td>Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.
Overall passing score: 50/100</td></tr>
<tr><td>Reading list</td><td>[1] Bassham, Irwin, Nardone, and Wallace, Critical Thinking: A Student's Introduction, 6th edition, McGraw-Hill Education, 2020.
[2] Moore, B.N. et al. (2009). Critical Thinking, 9th ed. McGraw-Hill
[3] Patrick J. Hurley (2012). A Concise Introduction to Logic (11th ed.), Wadsworth, Cengage Learning
+ Relevant web resources</td></tr>
</table>

2. Learning Outcomes Matrix (optional)

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO					
CLO	1	2	3	4	5	6
1						
2						
3						

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
1	Introduction to Critical thinking	1	HW 1/Quiz 1	Lecture, Discussion, Homework, Quiz	[1] Chapter 1
2	Recognizing arguments	2	HW 2/Quiz 2	Lecture, Discussion, Homework, Quiz	[1] Chapter 2
3	Basic logical concepts	2	HW 3/Quiz 3	Lecture, Discussion, Homework, Quiz	[1] Chapter 3
4	A little categorical logic	3	HW 4/Quiz 4	Lecture, Discussion, Homework, Quiz	[1] Chapter 9
5	A little propositional logic	3	HW 5/Quiz 5	Lecture, Discussion, Homework, Quiz	[1] Chapter 10
6	Logical fallacies I	4	HW 6/Quiz 6	Lecture, Discussion, Homework, Quiz	[1] Chapter 5
7	Logical fallacies II	4	HW 7/Quiz 7	Lecture, Discussion, Homework, Quiz	[1] Chapter 6
8	Review for midterm exam + sample test				
9 + 10	**Midterm exam: Chapters 1, 2, 3, 9, 10**				
11	Analyzing arguments	5	HW 8/Quiz 8	Lecture, Discussion, Homework	[1] Chapter 7
12	Evaluating arguments and truth claims	5	HW 9/Quiz 9	Lecture, Discussion, Homework	[1] Chapter 8

13	Inductive reasoning	2	HW 10/Quiz 10	Lecture, Discussion, Homework	[1] Chapter 11
14	Project: Group presentation	6	Group work	Presentation, Discussion	
15	Project: Group presentation	6	Group work	Presentation, Discussion	
16	Project: Group presentation	6	Group work	Presentation, Discussion	
17	**Review for final exam + sample test**				
18	Reserved week				
19+20	**Final exam: Chapters 5, 6, 7, 8, 11**				

4. Assessment plan

Assessment Type	**CLO 1**	**CLO 2**	**CLO 3**	**CLO 4**	**CLO 5**	**CLO 6**	**CLO 7**	**CLO 8**	**CLO 9**
Class participation and Assignments (30%)	80% Pass	80% Pass	80% Pass	80% Pass	80% Pass				80% Pass
Midterm exam (30%)						80% Pass	80% Pass	80% Pass	
Final exam (40%)						80% Pass	80% Pass	80% Pass	

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics (optional)

Course Name: Theoretical Models in Computing
Course Code: IT131

1. General information

Course designation	This course is oriented to those undergraduate students who require a working knowledge of numerical methods
Semester(s) in which the course is taught	
Person responsible for the course	Dr. Ha Viet Uyen Synh
Language	English
Relation to curriculum	Compulsory
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	Total workload: 195 Contact hours: 45 (lecture) + 30 (laboratory) Private study including examination preparation, specified in hours: 120
Credit points	Number of credits : 4 Lecture: 3 Laboratory: 1
Required and recommended prerequisites for joining the course	
Course objectives	This course is oriented to those undergraduate students who require a working knowledge of numerical methods. Topics to be covered include solving nonlinear equations and linear systems, interpolation and least square method, numerical evaluation of derivatives, integral and solution of differential equations. The focus will be on understanding the solving techniques and the engineering meaning of diver problems, and not on rigorous profs. ◆
Course learning outcomes	CLO 1. Solve numerically nonlinear equations by bisection, iterative and Newton methods. CLO 2. Solve big linear systems by exact and iterative methods. CLO 3. Fit data by interpolation polynomials, Spline ◆ polynomials and least square methods. CLO 4. Evaluate numerically derivatives and integrals. CLO 5. Solve numerically Boundary value problems by Euler, Euler improved and Finite Difference methods. CLO 6. Study diverse engineering problems by numerical methods

Competency level	Course learning outcome (CLO)
Knowledge	1,2,3,4,5
Skill	6
Attitude	

Content

The description of the contents should clearly indicate the weighting of the content and the level.

Weight: lecture session (3 hours)

Teaching levels: I (Introduce); T (Teach); U (Utilize)

Topic	Weight	Level
Chapter 1. Introduction	3	I
Chapter 2. Errors & Taylor Series	3	T,U

	Chapter 3. Roots of Non-linear Equations	3	T,U
	Chapter 4. Linear Algebraic Equations	6	T,U
	Chapter 5. Optimization	6	T,U
	Chapter 6. Curve Fitting & Interpolation	6	T,U
	Chapter 7. Numerical Differentiation and Integration	6	T,U
	Chapter 8. Ordinary Differential Equations	6	T,U
	Chapter 9. Partial Differential Equations	6	T,U
Examination forms	Multiple-choice questions, short-answer questions		
Study and examination requirements	Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. Assignments/Examination: Students must have more than 50/100 points overall to pass this course.		
Reading list	1. Steven C. Chapra, Raymond P. Canale, Numerical methods for engineers 6th, 2008		

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-6) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO					
CLO	1	2	3	4	5	6
1	x	x				
2	x					
3	x					
4		x				
5	x					
6		x				

3. Planned learning activities and teaching methods

Week	**Topic**	**CLO**	**Assessments**	**Learning activities**	**Resources**
1	Chapter 1. Introduction			lecture, exercises	
2	Chapter 2. Errors & Taylor Series	1	Quiz, Lab, Exam	lecture, exercises, lab	
3	Chapter 3. Roots of Non-linear Equations	1	Quiz, Lab, Exam	lecture, exercises, lab	
4	Chapter 4. Linear Algebraic Equations	2	Quiz, Lab, Exam	lecture, exercises, lab	
5	Chapter 5. Optimization	3	Quiz, Lab, Exam	lecture, exercises, lab	
6	**Midterm**				
	Chapter 6. Curve Fitting & Interpolation	4	Quiz, Lab, Exam	lecture, exercises, lab	

7	Chapter 7. Numerical Differentiation and Integration	5	Quiz, Lab, Exam	lecture, exercises, lab	
8	Chapter 8. Ordinary Differential Equations	6	Quiz, Exam	lecture, exercises, lab	
9	Chapter 9. Partial Differential Equations	6	Quiz, Exam	lecture, exercises, lab	
10	**Final exam**				

3. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4	CLO5	CLO6
Quiz (10%)	20%	20%	20%	20%	20%	20%
Labs (20%)	30%	30%	30%	30%	30%	30%
Midterm examination (30%)	50%	50%	50%			
Final examination (40%)				50%	50%	50%

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

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1. When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.↩

Rubrics (optional)

5.1. Grading checklist

Grading checklist for Written Reports			
Student: …….. HW/Assignment: ……. Date: …… Evaluator: ……			
	Max.	**Score**	**Comments**
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)	10		
TOTAL SCORE	100		

5.2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	**Description**

5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	Milestone		Benchmark
	4	3	2	1
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	Issue/ problem to be considered critically is stated without clarification or description.
Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation/ evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	Milestone		Benchmark
	4	3	2	1

Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022

Dean of School of Computer Science and Engineering

Assoc.Prof. Nguyen Van Sinh

PHỤ LỤC 3: BẢNG MÔ TẢ SỐ TÍN CHỈ THỰC TẬP CỦA CTĐT ĐƯỢC THỂ HIỆN CỤ THỂ THEO MÔN HỌC ĐỂ ĐẢM BẢO 8TC THỰC TẬP THEO QUY ĐỊNH TẠI THÔNG TƯ 17/2021/TT-BGDĐT

Chương trình kỹ sư Công nghệ thông tin - chuyên ngành Kỹ Thuật Mạng có tổng cộng 09 tín chỉ thực tập:

- Thực tập công nghiệp (IT082IU): 03 tín chỉ
- Thực tập tốt nghiệp (IT083IU): 03 tín chỉ
- Đồ án môn học Internet of Things (IT134IU, mini-project): 01 tín chỉ
- Đồ án môn học Net-centric Programming (IT096IU, mini-project): 01 tín chỉ
- Đồ án môn học System and Network Administration (IT125IU, mini-project): 01 tín chỉ.

Chương trình kỹ sư Công nghệ thông tin - chuyên ngành Kỹ Thuật Máy Tính có tổng cộng 08 tín chỉ thực tập:

- Thực tập công nghiệp (IT082IU): 03 tín chỉ
- Thực tập tốt nghiệp (IT083IU): 03 tín chỉ
- Đồ án môn học Internet of Things (IT134IU, mini-project): 01 tín chỉ
- Đồ án môn học Embedded Systems (IT115IU, mini-project): 01 tín chỉ.