

**CHƯƠNG TRÌNH ĐÀO TẠO KHÓA 2023 - NGÀNH KỸ THUẬT HÓA HỌC
TRÌNH ĐỘ ĐẠI HỌC**

*(Kèm theo Quyết định số /QĐ-ĐHQG ngày tháng năm 2023
của Hiệu trưởng Trường Đại học Quốc tế)*

1. Thông tin chung

- Tên ngành đào tạo:
 - + Tiếng Việt: Kỹ thuật Hóa học
 - + Tiếng Anh: Chemical Engineering
- Mã ngành đào tạo: 7520301
- Trình độ đào tạo: Đại học
- Loại hình đào tạo: Chính quy
- Thời gian đào tạo: 4.5 năm
- Tên văn bằng sau khi tốt nghiệp:
 - + Tiếng Việt: Kỹ sư Kỹ thuật Hóa học
 - + Tiếng Anh: Engineer in Chemical Engineering
- Nơi đào tạo: Trường Đại học Quốc tế - Đại học Quốc gia TP.HCM

2. Thông tin tuyển sinh và kế hoạch đào tạo

a. Đối tượng tuyển sinh

Đối tượng tuyển sinh căn cứ theo quy chế tuyển sinh đại học của Bộ Giáo dục và Đào tạo và Đề án tuyển sinh hàng năm của Đại học Quốc gia TP.HCM và Đề án tuyển sinh của trường Đại học Quốc tế.

b. Hình thức tuyển sinh

Trường Đại học Quốc tế thực hiện tuyển sinh theo Quy chế tuyển sinh Đại học ban hành hàng năm bởi Bộ Giáo dục & Đào tạo, căn cứ Đề án tuyển sinh hàng năm của Đại học Quốc gia TP.HCM và Đề án tuyển sinh của Trường Đại học Quốc tế.

c. Tổ hợp môn xét tuyển: A00; A01; B00; D07

d. Dự kiến chỉ tiêu tuyển sinh, quy mô đào tạo: 60

Năm	2023	2024	2025	2026	Từ 2027 trở đi
Tuyển sinh mới	60	60	60	60	60
Quy mô đào tạo	60	120	180	240	300

3. Mục tiêu đào tạo

a. Mục tiêu chung:

Đào tạo kỹ sư hóa học với triết lý ‘Job ready’, cụ thể như sau:

1. Có kiến thức cơ bản vững chắc về khoa học và kỹ thuật trong lĩnh vực hóa học và những lĩnh vực có liên quan (vd như sinh học, dược học, môi trường, v.v..).
2. Có khả năng vận dụng sáng tạo các kiến thức cơ bản trong ngành để giải quyết các vấn đề đa dạng trong các lĩnh vực nghề nghiệp.
3. Có đạo đức nghề nghiệp, hiểu rõ các vấn đề về môi trường, xã hội, an ninh và kinh tế.
4. Có đầy đủ các kỹ năng mềm, kỹ năng quản lý, khả năng làm việc nhóm, khả năng lãnh đạo, khả năng giao tiếp và làm việc chuyên môn thành thạo bằng tiếng Anh.
5. Có nhận thức về tầm quan trọng của việc trau dồi bản thân và không ngừng học tập suốt đời.

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	Luật giáo dục*
Có kiến thức cơ bản vững chắc về khoa học và kỹ thuật trong lĩnh vực hóa học và những lĩnh vực có liên quan (vd như sinh học, dược học, môi trường, v.v..). Có khả năng vận dụng sáng tạo các kiến thức cơ bản trong ngành để giải quyết các vấn đề đa dạng trong các lĩnh vực nghề nghiệp. Có đạo đức nghề nghiệp, hiểu rõ các vấn đề về môi trường, xã hội, an ninh và kinh tế. Có đầy đủ các kỹ năng mềm, kỹ năng quản lý, khả năng làm việc nhóm, khả năng lãnh đạo, khả năng giao tiếp và làm việc chuyên môn thành thạo bằng tiếng Anh. Có nhận thức về tầm quan trọng của việc trau dồi bản thân và không ngừng học tập suốt đời.	Hướng tới xây dựng bộ môn Kỹ thuật Hóa học thuộc tóp đầu tại Việt Nam và khu vực Đông Nam Á; là nơi vun đắp và phát triển nguồn nhân lực chất lượng cao cho thị trường lao động trong nước và quốc tế trong lĩnh vực Kỹ thuật Hóa học.	Là bộ môn đào tạo chất lượng giáo dục quốc tế, mang bản sắc văn hóa Việt Nam. Đào tạo chất lượng cao ngành Kỹ thuật Hóa học. Đạt chuẩn kiểm định chất lượng giáo dục theo tiêu chuẩn quốc tế. Giảng dạy và nghiên cứu thực hiện bằng tiếng Anh là điểm khác biệt nâng tầm quốc tế của bộ môn Kỹ thuật Hóa học. Người học được đào tạo và rèn luyện để trở thành công dân toàn cầu và có trách nhiệm với xã hội, dẫn dắt xã hội trong tương lai. Nghiên cứu cơ bản với hàm lượng tri thức lớn song hành với nghiên cứu ứng dụng, đáp ứng yêu cầu đổi mới sáng tạo và phát triển bền vững của doanh nghiệp, địa phương và xã hội; quan tâm, thúc đẩy các hoạt động kết nối và phục vụ	1. Đào tạo nhân lực trình độ cao, nâng cao dân trí, bồi dưỡng nhân tài; nghiên cứu khoa học và công nghệ tạo ra tri thức, sản phẩm mới, phục vụ nhu cầu phát triển kinh tế - xã hội, bảo đảm quốc phòng, an ninh, hội nhập quốc tế. 2. Đào tạo người học phát triển toàn diện về đức, trí, thể, mỹ; có tri thức, kỹ năng, trách nhiệm nghề nghiệp; có khả năng nắm bắt tiến bộ khoa học và công nghệ tương xứng với trình độ đào tạo, khả năng tự học, sáng tạo, thích nghi với môi trường làm việc; có tinh thần lập nghiệp, có ý thức phục vụ Nhân dân.

*Luật số: 43/2019/QH14, Luật Giáo Dục, Điều 39. Mục tiêu của giáo dục đại học

b. Mục tiêu cụ thể (Program Objectives - POs)

Mục tiêu cụ thể của CTĐT được xác định từ mục tiêu chung, bao gồm 04 mục tiêu, trong đó có 01 mục tiêu về kiến thức, 02 mục tiêu về kỹ năng và 01 mục tiêu về tự chủ và trách nhiệm, được trình bày như sau:

PO1 - Kiến thức:

PO1.1 Có nền tảng các kiến thức cơ bản vững chắc về khoa học và kỹ thuật khoa học trong lĩnh vực công nghệ hóa học (và các ngành khoa học liên quan như sinh học, dược học) hiện đại.

PO1.2 Có khả năng vận dụng sáng tạo các kiến thức cơ bản trong ngành để giải quyết các vấn đề trong đa dạng lĩnh vực nghề nghiệp.

PO2 - Kỹ năng:

PO2.1 Hiểu rõ hơn các vấn đề về môi trường, xã hội, an ninh và kinh tế ảnh hưởng đến quyết định và đạo đức nghề nghiệp.

PO2.2 Có các kỹ năng mềm cần thiết. Có khả năng làm việc nhóm, khả năng lãnh đạo và kỹ năng quản lý. Có khả năng giao tiếp và làm việc chuyên môn bằng tiếng Anh (ở mức thành thạo).

PO3 - Tự chủ và trách nhiệm:

PO3.1 Nhận thức và hiểu rõ tầm quan trọng của việc không ngừng học tập, trau dồi bản thân và khả năng học tập lâu dài.

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

STT	Chuẩn đầu ra Sinh viên tốt nghiệp từ chương trình KTHH sẽ có các năng lực
	Kiến thức
1	Xác định, xây dựng và giải quyết các vấn đề kỹ thuật hóa học phức tạp bằng cách áp dụng các nguyên tắc của kỹ thuật, khoa học và toán học.
2	Áp dụng thiết kế kỹ thuật hóa học để tạo ra giải pháp đáp ứng các nhu cầu cụ thể, có cân nhắc đến các yếu tố về sức khỏe cộng đồng, an toàn và phúc lợi, cũng như các yếu tố toàn cầu, văn hóa, xã hội, môi trường và kinh tế.
	Kỹ năng
3	Giao tiếp (bao gồm tiếng Anh) hiệu quả với nhiều đối tượng khác nhau.
4	Hoạt động hiệu quả trong một nhóm mà các thành viên cùng đưa ra vai trò lãnh đạo, tạo ra một môi trường hợp tác và hòa nhập, thiết lập mục tiêu, lập kế hoạch nhiệm vụ và đáp ứng các mục tiêu.
5	Phát triển và tiến hành các thí nghiệm thích hợp, phân tích và giải thích số liệu, đồng thời sử dụng đánh giá kỹ thuật để đưa ra kết luận.
6	Tiếp thu và áp dụng kiến thức mới khi cần thiết, sử dụng chiến lược học tập phù hợp.
	Thái độ
7	Nhận thức được trách nhiệm đạo đức và nghề nghiệp trong các tình huống kỹ thuật và đánh giá sáng suốt thông qua việc xem xét tác động của các giải pháp kỹ thuật trong bối cảnh về xã hội, môi trường, kinh tế, và toàn cầu.

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

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

	PLOs ⁽¹⁾	POs ⁽²⁾				
		PO1		PO2		PO3
		PO1.1	PO1.2	PO2.1	PO2.2	PO3.1
Kiến thức	PLO1	x	x			
	PLO2		x	x		
Kỹ năng	PLO3			x	x	
	PLO4				x	
	PLO5				x	
	PLO6			x	x	
Thái độ	PLO7					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	$90 \leq \text{ĐTBTL} \leq 100$	$9,0 \leq \text{ĐTBTL} \leq 10$	4,0	A ⁺
Giỏi	$80 \leq \text{ĐTBTL} < 90$	$8,0 \leq \text{ĐTBTL} < 9,0$	3,5	A
Khá	$70 \leq \text{ĐTBTL} < 80$	$7,0 \leq \text{ĐTBTL} < 8,0$	3,0	B ⁺
Trung bình khá	$60 \leq \text{ĐTBTL} < 70$	$6,0 \leq \text{ĐTBTL} < 7,0$	2,5	B
Trung bình	$50 \leq \text{ĐTBTL} < 60$	$5,0 \leq \text{ĐTBTL} < 6,0$	2,0	C
Không đạt				
Yếu	$40 \leq \text{ĐTBTL} < 50$	$4,0 \leq \text{ĐTBTL} < 5,0$	1,5	D ⁺
Kém	$30 \leq \text{ĐTBTL} < 40$	$3,0 \leq \text{ĐTBTL} < 4,0$	1,0	D
	$\text{ĐTBTL} < 30$	$\text{ĐTBTL} < 3,0$	0,0	F

8. Khối lượng kiến thức toàn khoá

Tổng số tín chỉ: 151 tín chỉ, trong đó phân bổ kiến thức như Bảng 4 (không bao gồm giáo dục thể chất và giáo dục quốc phòng):

Bảng 4. Cấu trúc chương trình đào tạo

TT	Các khối kiến thức ⁽³⁾	Khối lượng	
		Số tín chỉ	%
I	Khối kiến thức giáo dục đại cương	56	37.09
II	Khối kiến thức cơ sở ngành	36	23.84
III	Kiến thức chuyên ngành	36	23.84
IV	Kiến thức bổ trợ	2	1.32
V	Thực tập, khóa luận/luận văn tốt nghiệp	21	13.91
	Tổng cộng	151	100

9. Nội dung chương trình đào tạo

Bảng 5. Các môn học thuộc CTĐT

STT	Mã MH	Tên môn học (MH)		Loại MH (bắt buộc/ tự chọn)	Tín chỉ			Phòng TN (**)
		Tiếng Anh	Tiếng Việt		Tổng cộng	Lý thuyết	Thực hành/ Thí nghiệm	
I	Kiến thức giáo dục đại cương				56			
I.1	Lý luận chính trị				11			
1	PE015IU	Philosophy of Marxism and Leninism	Triết học Mác-Lênin	Bắt buộc	3	3	0	
2	PE016IU	Political economics of Marxism and Leninism	Kinh tế chính trị Mác-Lênin	Bắt buộc	2	2	0	
3	PE017IU	Scientific socialism	Chủ nghĩa xã hội khoa học	Bắt buộc	2	2	0	
4	PE018IU	History of Vietnamese Communist Party	Lịch sử Đảng Cộng Sản Việt Nam	Bắt buộc	2	2	0	
5	PE019IU	Ho Chi Minh's Thoughts	Tư tưởng HCM	Bắt buộc	2	2	0	
I.2	Khoa học xã hội – Nhân văn – Nghệ thuật				9			
6	PE021IU	General Law	Pháp luật đại cương	Bắt buộc	3	3	0	
7	PE008IU	Critical Thinking	Tư duy phân tích	Bắt buộc	3	3	0	
8	PE020IU	Engineering Ethics and Professional Skills	Đạo đức và kỹ năng nghề nghiệp	Bắt buộc	3	3	0	
I.3	Ngoại ngữ				8			
9	EN007IU	Writing AE1	Tiếng Anh chuyên ngành 1 (kỹ năng viết)	Bắt buộc	2	2	0	
10	EN008IU	Listening AE1	Tiếng Anh chuyên ngành 1 (kỹ năng nghe)	Bắt buộc	2	2	0	
11	EN011IU	Writing AE2	Tiếng Anh chuyên ngành 2 (kỹ năng viết)	Bắt buộc	2	2	0	

12	EN012IU	Speaking AE2	Tiếng Anh chuyên ngành 2 (kỹ năng nói)	Bắt buộc	2	2	0	
I.4	Toán – Tin học – Khoa học tự nhiên – Công nghệ - Môi trường				25			
13	MA001IU	Calculus 1	Toán 1	Bắt buộc	4	4	0	
14	MA003IU	Calculus 2	Toán 2	Bắt buộc	4	4	0	
15	PH013IU	Physics 1 - Mechanics	Vật lý 1	Bắt buộc	2	2	0	
16	CH011IU	Chemistry for Engineers	Hóa đại cương	Bắt buộc	3	3	0	
17	CH012IU	Chemistry Laboratory	Thực hành Hóa đại cương	Bắt buộc	1	0	1	
18	ENEE1014IU	Engineering Drawing	Vẽ kỹ thuật	Bắt buộc	2	2	0	PTN Máy tính
19	ENEE1015IU	Engineering Drawing Lab	Thực hành Vẽ kỹ thuật	Bắt buộc	1	0	1	
20	ENEE1019IU	Applied Statistics	Thống kê ứng dụng	Bắt buộc	2	2	0	
21	ENEE1020IU	Applied Statistics Lab	Thực hành Thống kê ứng dụng	Bắt buộc	1	0	1	
22	CHE0011IU	Applied Mechanics	Cơ ứng dụng	Bắt buộc	2	2	0	
23	CE205IU	Fluid Mechanics	Cơ học lưu chất	Bắt buộc	2	2	0	
24	CE206IU	Fluid Mechanics Lab	Thực hành cơ lưu chất	Bắt buộc	1	0	1	PTN Xây dựng
I.5	Kinh tế - Quản lý (chọn 1 trong 4 môn)				3			
25	IT120IU	Entrepreneurship	Khởi nghiệp	Tự chọn	3	3	0	
26	ENEE4011IU	Engineering Project Management	Quản lý dự án kỹ thuật	Tự chọn	3	3	0	
27	BA115IU	Introduction to Business Administration	Quản trị học	Tự chọn	3	3	0	

28	BA154IU	Entrepreneurship and Small Business Management	Sáng lập doanh nghiệp	Tự chọn	3	3	0	
II	Kiến thức cơ sở ngành				36			
29	CHE1011IU	Introduction to Chemical Engineering	Nhập môn kỹ thuật hóa học	Bắt buộc	2	2	0	
30	CHE2103IU	Inorganic Chemistry	Hóa vô cơ	Bắt buộc	3	3	0	
31	CHE2104IU	Inorganic Chemistry Lab	Thực hành Hóa vô cơ	Bắt buộc	1	0	1	PTN Hóa ứng dụng
32	CHE1081IU	Organic Chemistry 1	Hóa hữu cơ 1	Bắt buộc	3	3	0	
33	CHE1091IU	Organic Chemistry 2	Hóa hữu cơ 2	Bắt buộc	3	3	0	
34	CHE1092IU	Organic Chemistry Laboratory	Thực hành Hóa hữu cơ	Bắt buộc	2	0	2	
35	CHE1051IU	Analytical Chemistry 1	Hóa phân tích 1	Bắt buộc	3	3	0	
36	CHE1061IU	Analytical Chemistry 2	Hóa phân tích 2	Bắt buộc	3	3	0	
37	CHE1062IU	Analytical Chemistry Laboratory	Thực hành Hóa phân tích	Bắt buộc	2	0	2	PTN Hóa UĐ, KT TP, Chế biến TP, Dinh dưỡng
38	CHE1031IU	Physical Chemistry 1	Hóa lý 1	Bắt buộc	3	3	0	
39	CHE1043IU	Physical Chemistry 2	Hóa lý 2	Bắt buộc	2	2	0	
40	CHE1044IU	Physical Chemistry 2 Lab	Thực hành hóa lý 2	Bắt buộc	1	0	1	PTN Hóa UĐ, KT TP, Chế biến TP, Dinh dưỡng

41	CHE1104IU	Biochemistry	Hóa sinh	Bắt buộc	3	3	0	
42	CHE1105IU	Biochemistry Lab	Thực hành Hóa sinh	Bắt buộc	1	0	1	PTN Hóa ứng dụng
43	CHE1021IU	Process Instrumentation and Control	Đo lường và điều khiển quá trình	Bắt buộc	2	2	0	
44	CHE1111IU	Industrial Chemistry	Hóa học công nghiệp	Bắt buộc	2	2	0	
III	Kiến thức chuyên ngành				36			
III. 1	Kiến thức chuyên ngành (bắt buộc)				27			
45	CHE2011IU	Reaction Kinetics and Catalysis	Động học phản ứng và xúc tác	Bắt buộc	3	3	0	
46	CHE2024IU	Computational Chemistry	Hóa tính toán	Bắt buộc	2	2	0	
47	CHE2025IU	Computational Chemistry lab	Thực hành hóa tính toán	Bắt buộc	1	0	1	Trung tâm Tính toán Sinh học – Hóa học
48	CHE2034IU	Simulation and Optimization	Mô phỏng và tối ưu hóa	Bắt buộc	2	2	0	
49	CHE2035IU	Simulation and Optimization Lab	Thực hành Mô phỏng và tối ưu hóa	Bắt buộc	1	0	1	PTN Máy tính
50	CHE2041IU	Mass Transfer Operations	Quá trình và thiết bị truyền khối	Bắt buộc	3	3	0	
51	CHE2051IU	Heat Transfer Operations	Quá trình và thiết bị truyền nhiệt	Bắt buộc	3	3	0	
52	CHE2061IU	Chemical Reaction Engineering	Kỹ thuật phản ứng	Bắt buộc	3	3	0	
53	CHE2071IU	Mechanical Unit Operations	Các quá trình và thiết bị cơ học	Bắt buộc	3	3	0	

54	CHE2081IU	Occupational Introduction to Health Safety and Environment	Giới thiệu về an toàn sức khỏe và môi trường	Bắt buộc	2	2	0	
55	CHE2012IU	Chemical Engineering Lab	Thực hành kỹ thuật hóa học	Bắt buộc	1	0	1	PTN Kỹ thuật Hóa học
56	CHE2092IU	Chemical Process Design and Simulation	Thiết kế và mô phỏng quá trình hóa học	Bắt buộc	3	0	3	PTN Máy tính
III. 2	Kiến thức chuyên ngành (tự chọn) <i>Sinh viên chọn tối thiểu 9 tín chỉ bất kì trong các môn học tự chọn trong danh sách:</i>				9			
57	CHE3111IU	Green Chemical Engineering	Kỹ thuật hóa học xanh	Tự chọn	3	3	0	
58	CHE3211IU	Nanomaterials	Vật liệu nano	Tự chọn	3	3	0	
59	CHE3221IU	Biomaterials	Vật liệu sinh học	Tự chọn	3	3	0	
60	CHE3311IU	Organic Chemistry Synthesis	Tổng hợp hữu cơ	Tự chọn	3	3	0	
61	CHE3414IU	Advanced Engineering Drawing	Vẽ kỹ thuật nâng cao	Tự chọn	2	2	0	
62	CHE3415IU	Advanced Engineering Drawing Lab	Thực hành Vẽ kỹ thuật nâng cao	Tự chọn	1	0	1	
63	CHE3121IU	Environmental Chemistry 1	Hóa môi trường 1	Tự chọn	3	3	0	
64	CHE3131IU	Environmental Chemistry 2	Hóa môi trường 2	Tự chọn	3	3	0	
65	CHE3231IU	Heterogeneous Catalysis	Xúc tác dị thể	Tự chọn	3	3	0	
66	CHE3324IU	Methods for Natural Products and Drugs	Các phương pháp nghiên cứu cho hợp chất thiên nhiên và thuốc	Tự chọn	2	2	0	
67	CHE3325IU	Methods for Natural Products and Drugs lab	Thực hành Các phương pháp nghiên cứu cho hợp chất thiên nhiên và thuốc	Tự chọn	1	0	1	

68	CHE3421IU	Piping and Instruments System Design	Thiết kế đường ống và thiết bị	Tự chọn	3	3	0	
69	CHE3141IU	Sustainable Energy	Năng lượng bền vững	Tự chọn	3	3	0	
70	CHE3151IU	Natural Gas Processing	Chế biến khí thiên nhiên	Tự chọn	3	3	0	
71	CHE3241IU	Bioinorganic Chemistry	Hóa sinh vô cơ	Tự chọn	3	3	0	
72	CHE3331IU	Medicinal Chemistry	Hóa dược	Tự chọn	3	3	0	
73	CHE3431IU	Treatment Plant Operation	Vận hành nhà máy xử lý	Tự chọn	3	3	0	
74	CHE3251IU	Corrosion Chemistry	Hóa học ăn mòn	Tự chọn	3	3	0	
75	CHE0042IU	Project 1	Đồ án môn học 1	Tự chọn	1	0	1	
76	CHE0052IU	Project 2	Đồ án môn học 2	Tự chọn	1	0	1	
77	CHE0062IU	Project 3	Đồ án môn học 3	Tự chọn	1	0	1	
IV	Kiến thức bổ trợ				2			
78	CHE0041IU	Research Methodology	Phương pháp nghiên cứu khoa học	Bắt buộc	2	2	0	
V	Thực tập, khóa luận/ luận văn tốt nghiệp				21			
79	CHE4012IU	Research 1	Nghiên cứu 1	Bắt buộc	1	0	1	
80	CHE4062IU	Internship 1	Thực tập 1	Bắt buộc	2	0	2	
81	CHE4072IU	Internship 2	Thực tập 2	Bắt buộc	3	0	3	
82	CHE4082IU	Internship 3	Thực tập 3	Bắt buộc	3	0	3	
83	CHE4512IU	Pre-thesis	Đề cương luận văn	Bắt buộc	2	0	2	
84	CHE4522IU	Thesis	Luận văn	Bắt buộc	10	0	1	
	Tổng số (tín chỉ)				151			

10. Dự kiến kế hoạch giảng dạy (phân bố 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

Bảng 6. Kế hoạch giảng dạy đối với người học đạt trình độ AE1

Học kỳ	Mã MH	Tên Môn học		Loại MH (bắt buộc/ tự chọn)	Tín chỉ			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	
HỌC KỲ I					16			
I (16 tín chỉ)	EN007IU	Tiếng Anh chuyên ngành 1 (kỹ năng viết)	Writing AE1	Bắt buộc	2	2	0	
	EN008IU	Tiếng Anh chuyên ngành 1 (kỹ năng nghe)	Listening AE1	Bắt buộc	2	2	0	
	MA001IU	Toán 1	Calculus 1	Bắt buộc	4	4	0	
	CH011IU	Hóa đại cương	Chemistry for Engineers	Bắt buộc	3	3	0	
	PE015IU	Triết học Mac-Lenin	Philosophy of Marxism and Leninism	Bắt buộc	3	3	0	SH: PE016IU
	PE016IU	Kinh tế chính trị Mác-Lenin	Political Economics of Marxism and Leninism	Bắt buộc	2	2	0	SH: PE015IU
	PT001IU	Giáo dục thể chất 1	Physical Training 1	Bắt buộc	3	0	3	
HỌC KỲ II					17			
II (17 tín chỉ)	EN011IU	Tiếng Anh chuyên ngành 2 (kỹ năng viết)	Writing AE2	Bắt buộc	2	2	0	
	EN012IU	Tiếng Anh chuyên ngành 2 (kỹ năng nói)	Speaking AE2	Bắt buộc	2	2	0	
	MA003IU	Toán 2	Calculus 2	Bắt buộc	4	4	0	HT: MA001IU

	PE021IU	Pháp luật đại cương	General Law	Bắt buộc	3	3	0	
	PH013IU	Vật lý 1	Physics 1 - Mechanics	Bắt buộc	2	2	0	
	CE205IU	Cơ học lưu chất	Fluid Mechanics	Bắt buộc	2	2	0	
	CE206IU	Thực hành Cơ lưu chất	Fluid Mechanics Lab	Bắt buộc	1	0	1	SH: CE205IU
	CH012IU	Thực hành hóa đại cương	Chemistry Laboratory	Bắt buộc	1	0	1	HT: CH011IU
	PT002IU	Giáo dục thể chất 2	Physical Training 2	Bắt buộc	3	0	3	
HỌC KỲ HÈ Năm I								
		Giáo dục quốc phòng	Military education	Bắt buộc				
HỌC KỲ III					17			
III (17 tín chỉ)	CHE1011IU	Nhập môn kỹ thuật hóa học	Introduction to Chemical Engineering	Bắt buộc	2	2	0	
	CHE2103IU	Hóa vô cơ	Inorganic Chemistry	Bắt buộc	3	3	0	HT: CH011IU
	CHE2104IU	Thực hành Hóa vô cơ	Inorganic Chemistry Lab	Bắt buộc	1	0	1	SH: CHE2103IU
	ENEE1019IU	Thống kê ứng dụng	Applied Statistics	Bắt buộc	2	2	0	HT: MA001IU
	ENEE1020IU	Thực hành Thống kê ứng dụng	Applied Statistics Lab	Bắt buộc	1	0	1	SH: ENEE1019IU
	ENEE1014IU	Engineering Drawing	Vẽ kỹ thuật	Bắt buộc	2	2	0	
	ENEE1015IU	Engineering Drawing Lab	Thực hành Vẽ kỹ thuật	Bắt buộc	1	0	1	SH: ENEE1014IU
	CHE0011IU	Cơ ứng dụng	Applied Mechanics	Bắt buộc	2	2	0	HT: PH013IU HT:MA001IU
	PE008IU	Tư duy phân tích	Critical Thinking	Bắt buộc	3	3	0	
HỌC KỲ IV					16			
IV (16 tín chỉ)	CHE1051IU	Hóa phân tích 1	Analytical Chemistry 1	Bắt buộc	3	3	0	HT: CH011IU
	CHE1031IU	Hóa lý 1	Physical Chemistry 1	Bắt buộc	3	3	0	HT: CH011IU HT: PH013IU HT:MA003IU
	CHE1081IU	Hóa hữu cơ 1	Organic Chemistry 1	Bắt buộc	3	3	0	HT: CH011IU
	CHE2051IU	Quá trình và thiết bị truyền nhiệt	Heat Transfer Operations	Bắt buộc	3	3	0	HT: CHE1031IU
	PE017IU	Chủ nghĩa xã hội khoa học	Scientific socialism (2,0)	Bắt buộc	2	2	0	HT: PE015IU HT: PE016IU
	CHE4062IU	Thực tập 1	Internship 1 (0,2)	Bắt buộc	2	0	2	

HỌC KỲ HÈ Năm II								
	Giáo dục quốc phòng	Military education	Bắt buộc					
HỌC KỲ V					16			
V (16 tín chỉ)	CHE2011IU	Động học phản ứng và xúc tác	Reaction Kinetics and Catalysis	Bắt buộc	3	3	0	
	PE019U	Tư tưởng HCM	Ho Chi Minh's Thoughts	Bắt buộc	2	2	0	HT: PE017IU
	CHE1043IU	Hóa lý 2	Physical Chemistry 2	Bắt buộc	2	2	0	HT: CHE1031IU
	CHE1044IU	Thực hành Hóa lý 2	Physical Chemistry 2 Lab	Bắt buộc	1	0	1	SH: CHE1043IU
	CHE2041IU	Quá trình và thiết bị truyền khối	Mass Transfer Operations	Bắt buộc	3	3	0	HT: CHE2051IU
	CHE1091IU	Hóa hữu cơ 2	Organic Chemistry 2	Bắt buộc	3	3	0	HT: CHE1081IU
	CHE1092IU	Thực hành Hóa hữu cơ	Organic Chemistry Laboratory	Bắt buộc	2	0	2	HT: CHE1091IU
HỌC KỲ VI					17			
VI (17 tín chỉ)	CHE2023IU	Hóa tính toán	Computational Chemistry	Bắt buộc	2	2	0	HT: CH011IU
	CHE2025IU	Thực hành hóa tính toán	Computational Chemistry Lab	Bắt buộc	1	0	1	HT: CHE2023IU
	CHE2071IU	Các quá trình và thiết bị cơ học	Mechanical Unit Operations	Bắt buộc	3	3	0	HT: PH013IU HT: MA003IU HT: CHE2041IU
	CHE2034IU	Mô phỏng và tối ưu hóa	Simulation and Optimization	Bắt buộc	2	2	0	
	CHE2035IU	Thực hành Mô phỏng và tối ưu hóa	Simulation and Optimization Lab	Bắt buộc	1	0	1	SH: CHE2034IU
	CHE1061IU	Hóa phân tích 2	Analytical Chemistry 2	Bắt buộc	3	3	0	HT: CHE1051IU
	CHE4012IU	Nghiên cứu 1	Research 1	Bắt buộc	1	0	1	
	CHE1062IU	Thực hành Hóa phân tích	Analytical Chemistry Laboratory	Bắt buộc	2	0	2	SH: CHE1061IU
	PE018IU	Lịch sử ĐCSVN	History of Vietnamese Communist Party	Bắt buộc	2	2	0	HT: PE017IU
HỌC KỲ HÈ Năm III					3			
(3 tín chỉ)	CHE4072IU	Thực tập 2	Internship 2	Bắt buộc	3	0	3	HT: CHE4062IU

HỌC KỲ VII					18			
VII (18 tín chỉ)	CHE1104IU	Hóa sinh	Biochemistry	Bắt buộc	3	3	0	HT: CH011IU
	CHE1105IU	Thực hành Hóa sinh	Biochemistry Lab	Bắt buộc	1	0	1	SH: CHE1104IU
	CHE1021IU	Đo lường và điều khiển quá trình	Process Instrumentation and Control	Bắt buộc	2	2	0	HT: CHE1011IU
	CHE2061IU	Kỹ thuật phản ứng	Chemical Reaction Engineering	Bắt buộc	3	3	0	HT: CHE1043IU HT: CHE2071IU
	<i>Chọn 3 môn học bắt kỳ (ít nhất 9 tín chỉ)</i>					9		
	CHE3111IU	Kỹ thuật hóa học xanh	Green Chemical Engineering	Tự chọn	3	3	0	HT: CHE2011IU
	CHE3211IU	Vật liệu nano	Nanomaterials	Tự chọn	3	3	0	
	CHE3221IU	Vật liệu sinh học	Biomaterials	Tự chọn	3	3	0	
	CHE3311U	Tổng hợp hữu cơ	Organic Chemistry Synthesis	Tự chọn	3	3	0	HT: CHE1091IU
	CHE3414IU	Vẽ kỹ thuật nâng cao	Advanced Engineering Drawing	Tự chọn	2	2	0	HT: ENEE1001IU
	CHE3415IU	Thực hành Vẽ kỹ thuật Nâng cao	Advanced Engineering Drawing Lab	Tự chọn	1	0	1	SH: CHE3414IU
	CHE3121IU	Hóa môi trường 1	Environmental Chemistry 1	Tự chọn	3	3	0	HT: CHE1061IU
	CHE3131IU	Hóa môi trường 2	Environmental Chemistry 2	Tự chọn	3	3	0	
	CHE3231IU	Xúc tác dị thể	Heterogeneous Catalysis	Tự chọn	3	3	0	
	CHE3324IU	Các phương pháp nghiên cứu cho hợp chất thiên nhiên và thuốc	Methods for Natural Products and Drugs	Tự chọn	2	2	0	
	CHE3325IU	Thực hành Các phương pháp nghiên cứu cho hợp chất thiên nhiên và thuốc	Methods for Natural Products and Drugs Lab	Tự chọn	1	0	1	SH: CHE3324IU
	CHE3421IU	Thiết kế đường ống và thiết bị	Pipping and Instruments System Design	Tự chọn	3	3	0	
	CHE3141IU	Năng lượng bền vững	Sustainable Energy	Tự chọn	3	3	0	

	CHE3151IU	Chế biến khí thiên nhiên	Natural Gas Processing	Tự chọn	3	3	0	
	CHE3241IU	Hóa sinh vô cơ	Bioinorganic Chemistry	Tự chọn	3	3	0	
	CHE3331IU	Hóa dược	Medicinal Chemistry	Tự chọn	3	3	0	
	CHE3431IU	Vận hành nhà máy xử lý	Treatment Plant Operation	Tự chọn	3	3	0	
	CHE3251IU	Hóa học ăn mòn	Corrosion Chemistry	Tự chọn	3	3	0	
	CHE0042IU	Đồ án môn học 1	Project 1	Tự chọn	1	0	1	
	CHE0052IU	Đồ án môn học 2	Project 2	Tự chọn	1	0	1	
	CHE0062IU	Đồ án môn học 3	Project 3	Tự chọn	1	0	1	
HỌC KỲ VIII					18			
VIII (18 tín chỉ)	CHE2092IU	Thiết kế và mô phỏng quá trình hóa học	Chemical Process Design and Simulation	Bắt buộc	3	0	3	HT: CHE2011IU, CHE2061IU, CHE2041IU, CHE2051IU, CHE2071IU
	CHE2012IU	Thực hành Kỹ thuật hóa học	Chemical Engineering Lab	Bắt buộc	1	0	1	
	CHE4512IU	Đề cương luận văn	Pre-thesis	Bắt buộc	2	0	2	
	CHE1111IU	Hóa học công nghiệp	Industrial Chemistry	Bắt buộc	2	2	0	HT: CHE2011IU HT: CH011IU
	CHE2081IU	An toàn sức khỏe nghề nghiệp và môi trường	Occupational Health Safety and Environment (HSE)	Bắt buộc	2	2	0	
	CHE0041IU	Phương pháp nghiên cứu khoa học	Research Methodology	Bắt buộc	2	2	0	
	PE020IU	Đạo đức và kỹ năng nghề nghiệp	Engineering Ethics and Professional Skills	Bắt buộc	3	3	0	
	Kinh tế - Quản lý (chọn 1 trong 4 môn)		Economy – Management	Bắt buộc	3	3	0	
	IT120IU	Khởi nghiệp	Entrepreneurship	Tự chọn	3	3	0	
	ENEE4011IU	Quản lý dự án kỹ thuật	Engineering Project Management	Tự chọn	3	3	0	

	BA115IU	Quản trị học	Introduction to Business Administration	Tự chọn	3	3	0	
	BA154IU	Sáng lập doanh nghiệp	Entrepreneurship and Small Business Management	Tự chọn	3	3	0	
HỌC KỲ HÈ Năm IV					3			
(3 tín chỉ)	CHE4082IU	Thực tập 3	Internship 3 (0,3)	Bắt buộc	3	0	3	HT: CHE4072IU
HỌC KỲ IX					10			
IX (10 tín chỉ)	CHE4522IU	Luận văn	Thesis	Bắt buộc	10	0	10	HT: CHE4512IU
	Tổng cộng				151			

10.2. Trình độ IE2

Bảng 7. Kế hoạch giảng dạy đối với người học đạt trình độ IE2

Học kỳ	Mã MH	Tên MH		Loại MH (bắt buộc/ tự chọn)	Tín chỉ			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	
HỌC KỲ I					5			
I (5 tín chỉ)	ENTP02	Tiếng Anh 2	Intensive English 2 (IE2)	Bắt buộc	13	13	0	
	PH013IU	Vật lý 1	Physics 1 - Mechanics	Bắt buộc	2	2	0	
	CH011IU	Hóa đại cương	Chemistry for Engineers	Bắt buộc	3	3	0	
	PT001IU	Giáo dục thể chất 1	Physical Training 1	Bắt buộc	3	0	3	
HỌC KỲ II					20			
II (20 tín chỉ)	EN007IU	Tiếng Anh chuyên ngành 1 (kỹ năng viết)	Writing AE1	Bắt buộc	2	2	0	
	EN008IU	Tiếng Anh chuyên ngành 1 (kỹ năng nghe)	Listening AE1	Bắt buộc	2	2	0	
	PE021IU	Pháp luật đại cương	General Law	Bắt buộc	3	3	0	
	MA001IU	Toán 1	Calculus 1	Bắt buộc	4	4	0	HT: MA001IU
	CE205IU	Cơ học lưu chất	Fluid Mechanics	Bắt buộc	2	2	0	
	CE206IU	Thực hành Cơ lưu chất	Fluid Mechanics Lab	Bắt buộc	1	0	1	SH: CE205IU
	CH012IU	Thực hành hóa đại cương	Chemistry Laboratory	Bắt buộc	1	0	1	HT: CH011IU
	PE015IU	Triết học Mac-Lenin	Philosophy of Marxism and Leninism	Bắt buộc	3	3	0	SH: PE015IU
	PE016IU	Kinh tế chính trị Mác-Lenin	Political Economics of Marxism and Leninism	Bắt buộc	2	2	0	SH: PE016IU
	PT002IU	Giáo dục thể chất 2	Physical Training 2	Bắt buộc	3	0	3	

HỌC KỲ HÈ Năm I					4			
(4 tín chỉ)	EN011IU	Tiếng Anh chuyên ngành 2 (kỹ năng viết)	Writing AE2	Bắt buộc	2	2	0	
	EN012IU	Tiếng Anh chuyên ngành 2 (kỹ năng nói)	Speaking AE2	Bắt buộc	2	2	0	
HỌC KỲ III					21			
III (21 tín chỉ)	CHE1011IU	Nhập môn kỹ thuật hóa học	Introduction to Chemical Engineering	Bắt buộc	2	2	0	
	CHE2103IU	Hóa vô cơ	Inorganic Chemistry	Bắt buộc	3	3	0	HT: CH011IU
	CHE2104IU	Thực hành Hóa vô cơ	Inorganic Chemistry Lab	Bắt buộc	1	0	1	SH: CHE2103IU
	MA003IU	Toán 2	Calculus 2	Bắt buộc	4	4	0	HT: MA001IU
	ENEE1019IU	Thống kê ứng dụng	Applied Statistics	Bắt buộc	2	2	0	HT: MA001IU
	ENEE1020IU	Thực hành Thống kê ứng dụng	Applied Statistics Lab	Bắt buộc	1	0	1	HT: ENEE1019IU
	ENEE1014IU	Engineering Drawing	Vẽ kỹ thuật	Bắt buộc	2	2	0	
	ENEE1015IU	Engineering Drawing Lab	Thực hành Vẽ kỹ thuật	Bắt buộc	1	0	1	SH: ENEE1014IU
	CHE0011IU	Cơ ứng dụng	Applied Mechanics	Bắt buộc	2	2	0	HT: PH013IU HT: MA001IU
	PE008IU	Tư duy phân tích	Critical Thinking	Bắt buộc	3	3	0	
HỌC KỲ IV					16			
IV (16 tín chỉ)	CHE1051IU	Hóa phân tích 1	Analytical Chemistry 1	Bắt buộc	3	3	0	HT: CH011IU
	CHE1031IU	Hóa lý 1	Physical Chemistry 1	Bắt buộc	3	3	0	HT: CH011IU HT: PH013IU HT: MA003IU
	CHE1081IU	Hóa hữu cơ 1	Organic Chemistry 1	Bắt buộc	3	3	0	HT: CH011IU
	CHE2051IU	Quá trình và thiết bị truyền nhiệt	Heat Transfer Operations	Bắt buộc	3	3	0	HT: CHE1031IU

	PE017IU	Chủ nghĩa xã hội khoa học	Scientific socialism	Bắt buộc	2	2	0	HT: PE015IU HT: PE016IU
	CHE4062IU	Thực tập 1	Internship 1	Bắt buộc	2	0	2	
HỌC KỲ HÈ Năm II								
		Giáo dục quốc phòng	Military education	Bắt buộc				
HỌC KỲ V					16			
V (16 tín chỉ)	CHE2011IU	Động học phản ứng và xúc tác	Reaction Kinetics and Catalysis	Bắt buộc	3	3	0	
	PE019U	Tư tưởng HCM	Ho Chi Minh's Thoughts	Bắt buộc	2	2	0	HT: PE017IU
	CHE1043IU	Hóa lý 2	Physical Chemistry 2	Bắt buộc	2	2	0	HT: CHE1031IU
	CHE1044IU	Thực hành Hóa lý 2	Physical Chemistry 2 Lab	Bắt buộc	1	0	1	SH: CHE1043IU
	CHE2041IU	Quá trình và thiết bị truyền khối	Mass Transfer Operations	Bắt buộc	3	3	0	HT: CHE2051IU
	CHE1091IU	Hóa hữu cơ 2	Organic Chemistry 2	Bắt buộc	3	3	0	HT: CHE1081IU
	CHE1092IU	Thực hành Hóa hữu cơ	Organic Chemistry Laboratory	Bắt buộc	2	0	2	SH: CHE1091IU
HỌC KỲ VI					17			
VI (17 tín chỉ)	CHE2023IU	Hóa tính toán	Computational Chemistry	Bắt buộc	2	2	0	HT: CH011IU
	CHE2025IU	Thực hành hóa tính toán	Computational Chemistry Lab	Bắt buộc	1	0	1	HT: CHE2023IU
	CHE2071IU	Các quá trình và thiết bị cơ học	Mechanical Unit Operations	Bắt buộc	3	3	0	HT: PH013IU HT: MA003IU HT: CHE2041IU
	CHE2034IU	Mô phỏng và tối ưu hóa	Simulation and Optimization	Bắt buộc	2	2	0	
	CHE2035IU	Thực hành Mô phỏng và tối ưu hóa	Simulation and Optimization Lab	Bắt buộc	1	0	1	SH: CHE2034IU
	CHE1061IU	Hóa phân tích 2	Analytical Chemistry 2	Bắt buộc	3	3	0	HT: CHE1051IU
	CHE4012IU	Nghiên cứu 1	Research 1	Bắt buộc	1	0	1	
	CHE1062IU	Thực hành Hóa phân tích	Analytical Chemistry Laboratory	Bắt buộc	2	0	2	SH: CHE1061IU

	PE018IU	Lịch sử ĐCSVN	History of Vietnamese Communist Party	Bắt buộc	2	2	0	HT: PE017IU
HỌC KỲ HÈ Năm III					3			
	CHE4072IU	Thực tập 2	Internship 2	Bắt buộc	3	0	3	HT: CHE4062IU
HỌC KỲ VII					18			
VII (18 tín chỉ)	CHE1104IU	Hóa sinh	Biochemistry	Bắt buộc	3	3	0	HT: CH011IU
	CHE1105IU	Thực hành Hóa sinh	Biochemistry Lab	Bắt buộc	1	0	1	SH: CHE1104IU
	CHE1021IU	Đo lường và điều khiển quá trình	Process Instrumentation and Control	Bắt buộc	2	2	0	HT: CHE1011IU
	CHE2061IU	Kỹ thuật phản ứng	Chemical Reaction Engineering	Bắt buộc	3	3	0	HT: CHE1043IU HT: CHE2071IU
	<i>Chọn 3 môn học bắt kỳ (ít nhất 9 tín chỉ)</i>				9			
	CHE3111IU	Kỹ thuật hóa học xanh	Green Chemical Engineering	Tự chọn	3	3	0	HT: CHE2011IU
	CHE3211IU	Vật liệu nano	Nanomaterials	Tự chọn	3	3	0	
	CHE3221IU	Vật liệu sinh học	Biomaterials	Tự chọn	3	3	0	
	CHE3311IU	Tổng hợp hữu cơ	Organic Chemistry Synthesis	Tự chọn	3	3	0	HT: CHE1091IU
	CHE3414IU	Vẽ kỹ thuật nâng cao	Advanced Engineering Drawing	Tự chọn	2	2	0	HT: ENEE1001IU
	CHE3415IU	Thực hành Vẽ kỹ thuật Nâng cao	Advanced Engineering Drawing Lab	Tự chọn	1	0	1	SH: CHE3414IU
	CHE3121IU	Hóa môi trường 1	Environmental Chemistry 1	Tự chọn	3	3	0	HT: CHE1061IU
	CHE3131IU	Hóa môi trường 2	Environmental Chemistry 2	Tự chọn	3	3	0	
	CHE3231IU	Xúc tác dị thể	Heterogeneous Catalysis	Tự chọn	3	3	0	
	CHE3324IU	Các phương pháp nghiên cứu cho hợp chất thiên nhiên và thuốc	Methods for Natural Products and Drugs	Tự chọn	2	2	0	
	CHE3325IU	Thực hành Các phương pháp nghiên cứu cho hợp	Methods for Natural Products and Drugs Lab	Tự chọn	1	0	1	SH: CHE3324IU

		<i>chất thiên nhiên và thuốc</i>						
	CHE3421IU	Thiết kế đường ống và thiết bị	Pipping and Instruments System Design	Tự chọn	3	3	0	
	CHE3141IU	Năng lượng bền vững	Sustainable Energy	Tự chọn	3	3	0	
	CHE3151IU	Chế biến khí thiên nhiên	Natural Gas Processing	Tự chọn	3	3	0	
	CHE3241IU	Hóa sinh vô cơ	Bioinorganic Chemistry	Tự chọn	3	3	0	
	CHE3331IU	Hóa dược	Medicinal Chemistry	Tự chọn	3	3	0	
	CHE3431IU	Vận hành nhà máy xử lý	Treatment Plant Operation	Tự chọn	3	3	0	
	CHE3251IU	Hóa học ăn mòn	Corrosion Chemistry	Tự chọn	3	3	0	
	CHE0042IU	Đồ án môn học 1	Project 1	Tự chọn	1	0	1	
	CHE0052IU	Đồ án môn học 2	Project 2	Tự chọn	1	0	1	
	CHE0062IU	Đồ án môn học 3	Project 3	Tự chọn	1	0	1	
HỌC KỲ VIII					18			
VIII (18 tín chỉ)	CHE2092IU	Thiết kế và mô phỏng quá trình hóa học	Chemical Process Design and Simulation	Bắt buộc	3	0	3	HT: CHE2011IU, CHE2061IU, CHE2041IU, CHE2051IU, CHE2071IU
	CHE2012IU	Thực hành Kỹ thuật hóa học	Chemical Engineering Lab	Bắt buộc	1	0	1	
	CHE4512IU	Đề cương luận văn	Pre-thesis	Bắt buộc	2	0	2	
	CHE1111IU	Hóa học công nghiệp	Industrial Chemistry	Bắt buộc	2	2	0	HT: CHE2011IU HT: CH011IU
	CHE2081IU	An toàn sức khỏe nghề nghiệp và môi trường	Occupational Health Safety and Environment (HSE)	Bắt buộc	2	2	0	
	CHE0041IU	Phương pháp nghiên cứu khoa học	Research Methodology	Bắt buộc	2	2	0	
	PE020IU	Đạo đức và kỹ năng nghề nghiệp	Engineering Ethics and Professional Skills	Bắt buộc	3	3	0	

	Kinh tế - Quản lý (chọn 1 trong 4 môn)		Economy – Management	Bắt buộc	3	3	0	
	IT120IU	Khởi nghiệp	Entrepreneurship	Tự chọn	3	3	0	
	ENEE4011IU	Quản lý dự án kỹ thuật	Engineering Project Management	Tự chọn	3	3	0	
	BA115IU	Quản trị học	Introduction to Business Administration	Tự chọn	3	3	0	
	BA154IU	Sáng lập doanh nghiệp	Entrepreneurship and Small Business Management	Tự chọn	3	3	0	
HỌC KỲ HÈ Năm IV					3			
(3 tín chỉ)	CHE4082IU	Thực tập 3	Internship 3	Bắt buộc	3	0	3	HT: CHE4072IU
HỌC KỲ IX					10			
IX (10 tín chỉ)	CHE4522IU	Luận văn	Thesis	Bắt buộc	10	0	10	HT: CHE4512IU
	Tổng cộng				151			

10.3. Trình độ IE1

Bảng 8. Kế hoạch giảng dạy đối với người học đạt trình độ IE1

Học kỳ	Mã MH	Tên Môn học		Loại MH (bắt buộc/ tự chọn)	Tín chỉ			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	
HỌC KỲ I					0			
I (0 tín chỉ)	ENTP01	Tiếng Anh 1	Intensive English 1 (IE1)	Bắt buộc	17	17	0	
	ENTP02	Tiếng Anh 2	Intensive English 2 (IE2)	Bắt buộc	13	13	0	
HỌC KỲ II					21			
II (21 tín chỉ)	PE021IU	Pháp luật đại cương	General Law	Bắt buộc	3	3	0	
	CH011IU	Hóa đại cương	Chemistry for Engineers	Bắt buộc	3	3	0	
	EN007IU	Tiếng Anh chuyên ngành 1 (kỹ năng viết)	Writing AE1	Bắt buộc	2	2	0	
	EN008IU	Tiếng Anh chuyên ngành 1 (kỹ năng nghe)	Listening AE1	Bắt buộc	2	2	0	
	PH013IU	Vật lý 1	Physics 1 - Mechanics	Bắt buộc	2	2	0	
	MA001IU	Toán 1	Calculus 1	Bắt buộc	4	4	0	
	PE015IU	Triết học Mac-Lenin	Philosophy of Marxism and Leninism	Bắt buộc	3	3	0	SH: PE016IU
	PE016IU	Kinh tế chính trị Mác-Lenin	Political Economics of Marxism and Leninism	Bắt buộc	2	2	0	SH: PE015IU
	PT001IU	Giáo dục thể chất 1	Physical Training 1	Bắt buộc	3	0	3	
HỌC KỲ HÈ Năm I					4			
(4 tín chỉ)	EN011IU	Tiếng Anh chuyên ngành 2 (kỹ năng viết)	Writing AE2	Bắt buộc	2	2	0	
	EN012IU	Tiếng Anh chuyên ngành 2 (kỹ năng nói)	Speaking AE2	Bắt buộc	2	2	0	

	PT002IU	Giáo dục thể chất 2	Physical Training 2	Bắt buộc	3	0	3	
HỌC KỲ III					19			
III (19 tín chỉ)	CHE1011IU	Nhập môn kỹ thuật hóa học	Introduction to Chemical Engineering	Bắt buộc	2	2	0	
	CHE2103IU	Hóa vô cơ	Inorganic Chemistry	Bắt buộc	3	3	0	HT: CH011IU
	CHE2104IU	Thực hành Hóa vô cơ	Inorganic Chemistry Lab	Bắt buộc	1	0	1	HT: CHE2103IU
	CH012IU	Thực hành hóa đại cương	Chemistry Laboratory	Bắt buộc	1	0	1	HT: CH011IU
	CE205IU	Cơ học lưu chất	Fluid Mechanics	Bắt buộc	2	2	0	
	CE206IU	Thực hành Cơ lưu chất	Fluid Mechanics Lab	Bắt buộc	1	0	1	SH: CE205IU
	MA003IU	Toán 2	Calculus 2	Bắt buộc	4	4	0	HT: MA001IU
	ENEE1019IU	Thống kê ứng dụng	Applied Statistics	Bắt buộc	2	2	0	HT: MA001IU
	ENEE1020IU	Thực hành Thống kê ứng dụng	Applied Statistics Lab	Bắt buộc	1	0	1	SH: ENEE1019IU
	PE017IU	Chủ nghĩa xã hội khoa học	Scientific socialism	Bắt buộc	2	2	0	HT: PE015IU HT: PE016IU
HỌC KỲ IV					19			
IV (19 tín chỉ)	CHE0011IU	Cơ ứng dụng	Applied Mechanics	Bắt buộc	2	2	0	HT: PH013IU HT: MA001IU
	PE008IU	Tư duy phân tích	Critical Thinking	Bắt buộc	3	3	0	
	CHE1051IU	Hóa phân tích 1	Analytical Chemistry 1	Bắt buộc	3	3	0	HT: CH011IU
	CHE1031IU	Hóa lý 1	Physical Chemistry 1	Bắt buộc	3	3	0	HT: CH011IU HT: PH013IU HT: MA003IU
	CHE1081IU	Hóa hữu cơ 1	Organic Chemistry 1	Bắt buộc	3	3	0	HT: CH011IU
	CHE2051IU	Quá trình và thiết bị truyền nhiệt	Heat Transfer Operations	Bắt buộc	3	3	0	HT: CHE1031IU
	CHE4062IU	Thực tập 1	Internship 1	Bắt buộc	2	0	2	
HỌC KỲ HÈ Năm II								
		Giáo dục quốc phòng	Military education	Bắt buộc				

HỌC KỲ V					19			
V (19 tín chỉ)	ENEE1014IU	Engineering Drawing	Vẽ kỹ thuật	Bắt buộc	2	2	0	
	ENEE1015IU	Engineering Drawing Lab	Thực hành Vẽ kỹ thuật	Bắt buộc	1	0	1	SH: ENEE1014IU
	PE019IU	Tư tưởng HCM	Ho Chi Minh's Thoughts	Bắt buộc	2	2	0	HT: PE017IU
	CHE1043IU	Hóa lý 2	Physical Chemistry 2	Bắt buộc	2	2	0	HT: CHE1031IU
	CHE1044IU	Thực hành Hóa lý 2	Physical Chemistry 2 Lab	Bắt buộc	1	0	1	SH: CHE1043IU
	CHE2011IU	Động học phản ứng và xúc tác	Reaction Kinetics and Catalysis	Bắt buộc	3	3	0	
	CHE2041IU	Quá trình và thiết bị truyền khối	Mass Transfer Operations	Bắt buộc	3	3	0	HT: CHE2051IU
	CHE1091IU	Hóa hữu cơ 2	Organic Chemistry 2	Bắt buộc	3	3	0	HT: CHE1081IU
	CHE1092IU	Thực hành Hóa hữu cơ	Organic Chemistry Laboratory	Bắt buộc	2	0	2	SH: CHE1091IU
HỌC KỲ VI					17			
VI (17 tín chỉ)	CHE2023IU	Hóa tính toán	Computational Chemistry	Bắt buộc	2	2	0	HT: CH011IU
	CHE2025IU	Thực hành hóa tính toán	Computational Chemistry Lab	Bắt buộc	1	0	1	SH: CHE2023IU
	CHE2071IU	Các quá trình và thiết bị cơ học	Mechanical Unit Operations	Bắt buộc	3	3	0	HT: PH013IU HT: MA003IU HT: CHE2041IU
	CHE2034IU	Mô phỏng và tối ưu hóa	Simulation and Optimization	Bắt buộc	2	2	0	
	CHE2035IU	Thực hành Mô phỏng và tối ưu hóa	Simulation and Optimization Lab	Bắt buộc	1	0	1	HT: CHE2034IU
	CHE1061IU	Hóa phân tích 2	Analytical Chemistry 2	Bắt buộc	3	3	0	HT: CHE1051IU
	CHE4012IU	Nghiên cứu 1	Research 1	Bắt buộc	1	0	1	
	CHE1062IU	Thực hành Hóa phân tích	Analytical Chemistry Laboratory	Bắt buộc	2	0	2	SH: CHE1061IU
	PE018IU	Lịch sử ĐCSVN	History of Vietnamese Communist Party	Bắt buộc	2	2	0	HT: PE017IU

HỌC KỲ HÈ Năm III					3			
(3 tín chỉ)	CHE4072IU	Thực tập 2	Internship 2	Bắt buộc	3	0	3	HT: CHE4062IU
HỌC KỲ VII					18			
VII (18 tín chỉ)	CHE1104IU	Hóa sinh	Biochemistry	Bắt buộc	3	3	0	HT: CH011IU
	CHE1105IU	Thực hành Hóa sinh	Biochemistry Lab	Bắt buộc	1	0	1	SH: CHE1104IU
	CHE1021IU	Đo lường và điều khiển quá trình	Process Instrumentation and Control	Bắt buộc	2	2	0	HT: CHE1011IU
	CHE2061IU	Kỹ thuật phản ứng	Chemical Reaction Engineering	Bắt buộc	3	3	0	HT: CHE1043IU HT: CHE2071IU
	<i>Chọn 3 môn học bắt kỳ (ít nhất 9 tín chỉ)</i>				9			
	CHE3111IU	Kỹ thuật hóa học xanh	Green Chemical Engineering	Tự chọn	3	3	0	HT: CHE2011IU
	CHE3211IU	Vật liệu nano	Nanomaterials	Tự chọn	3	3	0	
	CHE3221IU	Vật liệu sinh học	Biomaterials	Tự chọn	3	3	0	
	CHE3311IU	Tổng hợp hữu cơ	Organic Chemistry Synthesis	Tự chọn	3	3	0	HT: CHE1091IU
	CHE3414IU	Vẽ kỹ thuật nâng cao	Advanced Engineering Drawing	Tự chọn	2	2	0	HT: ENEE1001IU
	CHE3415IU	Thực hành Vẽ kỹ thuật Nâng cao	Advanced Engineering Drawing Lab	Tự chọn	1	0	1	SH: CHE3414IU
	CHE3121IU	Hóa môi trường 1	Environmental Chemistry 1	Tự chọn	3	3	0	HT: CHE1061IU
	CHE3131IU	Hóa môi trường 2	Environmental Chemistry 2	Tự chọn	3	3	0	
	CHE3231IU	Xúc tác dị thể	Heterogeneous Catalysis	Tự chọn	3	3	0	
	CHE3324IU	Các phương pháp nghiên cứu cho hợp chất thiên nhiên và thuốc	Methods for Natural Products and Drugs	Tự chọn	2	2	0	
	CHE3325IU	Thực hành Các phương pháp nghiên cứu cho hợp chất thiên nhiên và thuốc	Methods for Natural Products and Drugs Lab	Tự chọn	1	0	1	SH: CHE3324IU

	CHE3421IU	Thiết kế đường ống và thiết bị	Pipping and Instruments System Design	Tự chọn	3	3	0	
	CHE3141IU	Năng lượng bền vững	Sustainable Energy	Tự chọn	3	3	0	
	CHE3151IU	Chế biến khí thiên nhiên	Natural Gas Processing	Tự chọn	3	3	0	
	CHE3241IU	Hóa sinh vô cơ	Bioinorganic Chemistry	Tự chọn	3	3	0	
	CHE3331IU	Hóa dược	Medicinal Chemistry	Tự chọn	3	3	0	
	CHE3431IU	Vận hành nhà máy xử lý	Treatment Plant Operation	Tự chọn	3	3	0	
	CHE3251IU	Hóa học ăn mòn	Corrosion Chemistry	Tự chọn	3	3	0	
	CHE0042IU	Đồ án môn học 1	Project 1	Tự chọn	1	0	1	
	CHE0052IU	Đồ án môn học 2	Project 2	Tự chọn	1	0	1	
	CHE0062IU	Đồ án môn học 3	Project 3	Tự chọn	1	0	1	
HỌC KỲ VIII					18			
VIII (18 tín chỉ)	CHE2092IU	Thiết kế và mô phỏng quá trình hóa học	Chemical Process Design and Simulation	Bắt buộc	3	0	3	HT: CHE2011IU, CHE2061IU, CHE2041IU, CHE2051IU, CHE2071IU
	CHE2012IU	Thực hành Kỹ thuật hóa học	Chemical Engineering Lab	Bắt buộc	1	0	1	
	CHE4512IU	Đề cương luận văn	Pre-thesis	Bắt buộc	2	0	2	
	CHE1111IU	Hóa học công nghiệp	Industrial Chemistry	Bắt buộc	2	2	0	HT: CHE2011IU HT: CH011IU
	CHE2081IU	An toàn sức khỏe nghề nghiệp và môi trường	Occupational Health Safety and Environment (HSE)	Bắt buộc	2	2	0	
	CHE0041IU	Phương pháp nghiên cứu khoa học	Research Methodology	Bắt buộc	2	2	0	
	PE020IU	Đạo đức và kỹ năng nghề nghiệp	Engineering Ethics and Professional Skills	Bắt buộc	3	3	0	

	Kinh tế - Quản lý (chọn 1 trong 4 môn)		Economy – Management	Bắt buộc	3	3	0	
	IT120IU	Khởi nghiệp	Entrepreneurship	Tự chọn	3	3	0	
	ENEE4011IU	Quản lý dự án kỹ thuật	Engineering Project Management	Tự chọn	3	3	0	
	BA115IU	Quản trị học	Introduction to Business Administration	Tự chọn	3	3	0	
	BA154IU	Sáng lập doanh nghiệp	Entrepreneurship and Small Business Management	Tự chọn	3	3	0	
HỌC KỲ HÈ Năm IV					3			
(3 tín chỉ)	CHE4082IU	Thực tập 3	Internship 3	Bắt buộc	3	0	3	HT: CHE4072IU
HỌC KỲ IX					10			
IX (10 tín chỉ)	CHE4522IU	Luận văn	Thesis	Bắt buộc	10	0	10	HT: CHE4512IU
	Tổng cộng				151			

10.4. Trình độ IE0

Bảng 9. Kế hoạch giảng dạy đối với người học đạt trình độ IE0

Học kỳ	Mã MH	Tên MH		Loại MH	Tín chỉ			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	
HỌC KỲ I					0			
I (0 tín chỉ)	ENTP00	Tiếng Anh 0	Intensive English 0 (IE0)		17	17	0	
	ENTP01	Tiếng Anh 1	Intensive English 1 (IE1)		17	17	0	
HỌC KỲ II					14			
II (14 tín chỉ)	PE021IU	Pháp luật đại cương	General Law	Bắt buộc	3	3	0	
	ENTP02	Tiếng Anh 2	Intensive English 2 (IE2)	Bắt buộc	13	13	0	
	PH013IU	Vật lý 1	Physics 1 - Mechanics	Bắt buộc	2	2	0	
	PE015IU	Triết học Mac-Lenin	Philosophy of Marxism and Leninism	Bắt buộc	3	3	0	SH: PE016IU
	PE016IU	Kinh tế chính trị Mác-Lenin	Political Economics of Marxism and Leninism	Bắt buộc	2	2	0	SH: PE015IU
	MA001IU	Toán 1	Calculus 1	Bắt buộc	4	4	0	
	PT001IU	Giáo dục thể chất 1	Physical Training 1	Bắt buộc	3	0	3	
HỌC KỲ HÈ Năm I					7			
(7 tín chỉ)	EN007IU	Tiếng Anh chuyên ngành 1 (kỹ năng viết)	Writing AE1	Bắt buộc	2	2	0	
	EN008IU	Tiếng Anh chuyên ngành 1 (kỹ năng nghe)	Listening AE1	Bắt buộc	2	2	0	
	CH011IU	Hóa đại cương	Chemistry for Engineers	Bắt buộc	3	3	0	
	PT002IU	Giáo dục thể chất 2	Physical Training 2	Bắt buộc	3	0	3	

HỌC KỲ III					21			
III (21 tín chỉ)	EN011IU	Tiếng Anh chuyên ngành 2 (kỹ năng viết)	Writing AE2	Bắt buộc	2	2	0	
	EN012IU	Tiếng Anh chuyên ngành 2 (kỹ năng nói)	Speaking AE2	Bắt buộc	2	2	0	
	CHE1011IU	Nhập môn kỹ thuật hóa học	Introduction to Chemical Engineering	Bắt buộc	2	2	0	
	CHE2103IU	Hóa vô cơ	Inorganic Chemistry	Bắt buộc	3	3	0	HT: CH011IU
	CHE2104IU	Thực hành Hóa vô cơ	Inorganic Chemistry Lab	Bắt buộc	1	0	1	SH: CHE2103IU
	CH012IU	Thực hành hóa đại cương	Chemistry Laboratory	Bắt buộc	1	0	1	HT: CH011IU
	CE205IU	Cơ học lưu chất	Fluid Mechanics	Bắt buộc	2	2	0	
	CE206IU	Thực hành Cơ lưu chất	Fluid Mechanics Lab	Bắt buộc	1	0	1	SH: CE205IU
	MA003IU	Toán 2	Calculus 2	Bắt buộc	4	4	0	HT: MA001IU
	ENEE1019IU	Thống kê ứng dụng	Applied Statistics	Bắt buộc	2	2	0	HT: MA001IU
	ENEE1020IU	Thực hành Thống kê ứng dụng	Applied Statistics Lab	Bắt buộc	1	0	1	SH: ENEE1019IU
HỌC KỲ IV					19			
IV (19 tín chỉ)	CHE0011IU	Cơ ứng dụng	Applied Mechanics	Bắt buộc	2	2	0	HT: PH013IU HT: MA001IU
	PE008IU	Tư duy phân tích	Critical Thinking	Bắt buộc	3	3	0	
	CHE1051IU	Hóa phân tích 1	Analytical Chemistry 1	Bắt buộc	3	3	0	HT: CH011IU
	CHE1031IU	Hóa lý 1	Physical Chemistry 1	Bắt buộc	3	3	0	HT: CH011IU HT: PH013IU HT: MA003IU
	CHE1081IU	Hóa hữu cơ 1	Organic Chemistry 1	Bắt buộc	3	3	0	HT: CH011IU

	CHE2051IU	Quá trình và thiết bị truyền nhiệt	Heat Transfer Operations	Bắt buộc	3	3	0	HT: CHE1031IU
	CHE4062IU	Thực tập 1	Internship 1 (0,2)	Bắt buộc	2	0	2	
HỌC KỲ HÈ Năm II								
		Giáo dục quốc phòng	Military education	Bắt buộc				
HỌC KỲ V					19			
V (19 tín chỉ)	ENEE1014IU	Engineering Drawing	Vẽ kỹ thuật	Bắt buộc	2	2	0	
	ENEE1015IU	Engineering Drawing Lab	Thực hành Vẽ kỹ thuật	Bắt buộc	1	0	1	SH: ENEE1014IU
	PE017IU	Chủ nghĩa xã hội khoa học	Scientific socialism (2,0)	Bắt buộc	2	2	0	HT: PE015IU HT: PE016IU
	CHE1043IU	Hóa lý 2	Physical Chemistry 2	Bắt buộc	2	2	0	HT: CHE1031IU
	CHE1044IU	Thực hành Hóa lý 2	Physical Chemistry 2 Lab	Bắt buộc	1	0	1	SH: CHE1043IU
	CHE2011IU	Động học phản ứng và xúc tác	Reaction Kinetics and Catalysis	Bắt buộc	3	3	0	
	CHE2041IU	Quá trình và thiết bị truyền khối	Mass Transfer Operations	Bắt buộc	3	3	0	HT: CHE2051IU
	CHE1091IU	Hóa hữu cơ 2	Organic Chemistry 2	Bắt buộc	3	3	0	HT: CHE1081IU
	CHE1092IU	Thực hành Hóa hữu cơ	Organic Chemistry Laboratory	Bắt buộc	2	0	2	SH: CHE1091IU
HỌC KỲ VI					17			
VI (17 tín chỉ)	CHE2023IU	Hóa tính toán	Computational Chemistry	Bắt buộc	2	2	0	HT: CH011IU
	CHE2025IU	Thực hành hóa tính toán	Computational Chemistry Lab	Bắt buộc	1	0	1	SH: CHE2023IU
	CHE2071IU	Các quá trình và thiết bị cơ học	Mechanical Unit Operations	Bắt buộc	3	3	0	HT: PH013IU HT: MA003IU HT: CHE2041IU
	CHE2034IU	Mô phỏng và tối ưu hóa	Simulation and Optimization	Bắt buộc	2	2	0	
	CHE2035IU	Thực hành Mô phỏng và tối ưu hóa	Simulation and Optimization Lab	Bắt buộc	1	0	1	SH: CHE2034IU

	CHE1061IU	Hóa phân tích 2	Analytical Chemistry 2	Bắt buộc	3	3	0	HT: CHE1051IU
	CHE4012IU	Nghiên cứu 1	Research 1	Bắt buộc	1	0	1	
	CHE1062IU	Thực hành Hóa phân tích	Analytical Chemistry Laboratory	Bắt buộc	2	0	2	SH: CHE1061IU
	PE019U	Tư tưởng HCM	Ho Chi Minh's Thoughts	Bắt buộc	2	2	0	HT: PE017IU
HỌC KỲ HÈ Năm III					3			
(3 tín chỉ)	CHE4072IU	Thực tập 2	Internship 2 (0,3)	Bắt buộc	3	0	3	HT: CHE4062IU
HỌC KỲ VII					20			
VII (20 tín chỉ)	PE018IU	Lịch sử ĐCSVN	History of Vietnamese Communist Party	Bắt buộc	2	2	0	HT: PE017IU
	CHE1104IU	Hóa sinh	Biochemistry	Bắt buộc	3	3	0	HT: CH011IU
	CHE1105IU	Thực hành Hóa sinh	Biochemistry Lab	Bắt buộc	1	0	1	SH: CHE1104IU
	CHE1021IU	Đo lường và điều khiển quá trình	Process Instrumentation and Control	Bắt buộc	2	2	0	HT: CHE1011IU
	CHE2061IU	Kỹ thuật phản ứng	Chemical Reaction Engineering	Bắt buộc	3	3	0	HT: CHE1043IU HT: CHE2071IU
	<i>Chọn 3 môn học bắt kỳ (ít nhất 9 tín chỉ)</i>				9			
	CHE3111IU	Kỹ thuật hóa học xanh	Green Chemical Engineering	Tự chọn	3	3	0	HT: CHE2011IU
	CHE3211IU	Vật liệu nano	Nanomaterials	Tự chọn	3	3	0	
	CHE3221IU	Vật liệu sinh học	Biomaterials	Tự chọn	3	3	0	
	CHE3311U	Tổng hợp hữu cơ	Organic Chemistry Synthesis	Tự chọn	3	3	0	HT: CHE1091IU
	CHE3414IU	Vẽ kỹ thuật nâng cao	Advanced Engineering Drawing	Tự chọn	2	2	0	HT: ENEE1001IU
	CHE3415IU	Thực hành Vẽ kỹ thuật Nâng cao	Advanced Engineering Drawing Lab	Tự chọn	1	0	1	SH: CHE3414IU
	CHE3121IU	Hóa môi trường 1	Environmental Chemistry 1	Tự chọn	3	3	0	HT: CHE1061IU
	CHE3131IU	Hóa môi trường 2	Environmental Chemistry 2	Tự chọn	3	3	0	
	CHE3231IU	Xúc tác dị thể	Heterogeneous Catalysis	Tự chọn	3	3	0	

	CHE3324IU	Các phương pháp nghiên cứu cho hợp chất thiên nhiên và thuốc	Methods for Natural Products and Drugs	Tự chọn	2	2	0	SH: CHE3324IU
	CHE3325IU	Thực hành Các phương pháp nghiên cứu cho hợp chất thiên nhiên và thuốc	Methods for Natural Products and Drugs Lab	Tự chọn	1	0	1	
	CHE3421IU	Thiết kế đường ống và thiết bị	Pipping and Instruments System Design	Tự chọn	3	3	0	
	CHE3141IU	Năng lượng bền vững	Sustainable Energy	Tự chọn	3	3	0	
	CHE3151IU	Chế biến khí thiên nhiên	Natural Gas Processing	Tự chọn	3	3	0	
	CHE3241IU	Hóa sinh vô cơ	Bioinorganic Chemistry	Tự chọn	3	3	0	
	CHE3331IU	Hóa dược	Medicinal Chemistry	Tự chọn	3	3	0	
	CHE3431IU	Vận hành nhà máy xử lý	Treatment Plant Operation	Tự chọn	3	3	0	
	CHE3251IU	Hóa học ăn mòn	Corrosion Chemistry	Tự chọn	3	3	0	
	CHE0042IU	Đồ án môn học 1	Project 1	Tự chọn	1	0	1	
	CHE0052IU	Đồ án môn học 2	Project 2	Tự chọn	1	0	1	
	CHE0062IU	Đồ án môn học 3	Project 3	Tự chọn	1	0	1	
HỌC KỲ VIII					18			
VII I (18 tín chỉ)	CHE2092IU	Thiết kế và mô phỏng quá trình hóa học	Chemical Process Design and Simulation	Bắt buộc	3	0	3	HT: CHE2011IU, CHE2061IU, CHE2041IU, CHE2051IU, CHE2071IU
	CHE2012IU	Thực hành Kỹ thuật hóa học	Chemical Engineering Lab	Bắt buộc	1	0	1	
	CHE4512IU	Đề cương luận văn	Pre-thesis	Bắt buộc	2	0	2	
	CHE1111IU	Hóa học công nghiệp	Industrial Chemistry	Bắt buộc	2	2	0	HT: CHE2011IU

								HT: CH011IU
	CHE2081IU	An toàn sức khỏe nghề nghiệp và môi trường	Occupational Health Safety and Environment (HSE)	Bắt buộc	2	2	0	
	CHE0041IU	Phương pháp nghiên cứu khoa học	Research Methodology	Bắt buộc	2	2	0	
	PE020IU	Đạo đức và kỹ năng nghề nghiệp	Engineering Ethics and Professional Skills	Bắt buộc	3	3	0	
	Kinh tế - Quản lý (chọn 1 trong 4 môn)		Economy – Management	Bắt buộc	3	3	0	
	IT120IU	Khởi nghiệp	Entrepreneurship	Tự chọn	3	3	0	
	ENEE4011IU	Quản lý dự án kỹ thuật	Engineering Project Management	Tự chọn	3	3	0	
	BA115IU	Quản trị học	Introduction to Business Administration	Tự chọn	3	3	0	
	BA154IU	Sáng lập doanh nghiệp	Entrepreneurship and Small Business Management	Tự chọn	3	3	0	
HỌC KỲ HÈ Năm IV					3			
(3 tín chỉ)	CHE4082IU	Thực tập 3	Internship 3 (0,3)	Bắt buộc	3	0	3	HT: CHE4072IU
HỌC KỲ IX					10			
IX (10 tín chỉ)	CHE4522IU	Luận văn	Thesis	Bắt buộc	10	0	10	HT: CHE4512IU
	Tổng cộng				151			

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 Kỹ thuật Hóa học được trình bày như Bảng 10.

Bảng 10. Đóng góp của các môn học vào CDR của CTĐT

HỌC KỲ I								
TÊN MÔN HỌC								
Writing AE1	CLOs		ILOs					
			Knowledge		Skills			Attitudes
			1	2	3	4	5	6
	Knowledge (Level: 1-6)	1			5			
	Skills (Level: 1-7)	2			5			
	Attitudes (Level: 1-5)	3						
	Contribution of CLOs to ILOs							
	Bloom's Taxonomy	AVE	0.0	0.0	5.0	0.0	0.0	0.0
	L,M,H conversion*				H			
Listening AE1	CLOs		ILOs					
			Knowledge		Skills			Attitudes
			1	2	3	4	5	6
	Knowledge (Level: 1-6)	1						
		2						
	Skills (Level: 1-7)	3			5			
		4			5			
	Attitudes (Level: 1-5)	5						
	Contribution of CLOs to ILOs							
	Bloom's Taxonomy	AVE	0.0	0.0	5.0	0.0	0.0	0.0
	L,M,H conversion*				H			

Calculus 1	CLOs		ILOs						
			Knowledge		Skills				Attitudes
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1	4						
		2	4						
	Skills (Level: 1-7)	3					3		
		4					3		
	Attitudes (Level: 1-5)	5							
	Contribution of CLOs to ILOs								
	Bloom's Taxonomy	AVE	4.0	0.0	0.0	0.0	3.0	0.0	0.0
	L,M,H conversion*		H				M		
Physics 1 (Mechanics)	CLOs		ILOs						
			Knowledge		Skills				Attitudes
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1	4						
		2		4					
	Skills (Level: 1-7)	3						4	
	Attitudes (Level: 1-5)	4							
	Contribution of CLOs to ILOs								
	Bloom's Taxonomy	AVE	4.0	4.0	0.0	0.0	0.0	4.0	0.0
	L,M,H conversion*		H	H				H	

Writing AE2	CLOs		ILOs						
			Knowledge		Skills				Attitudes
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1							
	Skills (Level: 1-7)	2			7				
		3			7				
	Attitudes (Level: 1-5)	4							
		5							
	Contribution of CLOs to ILOs								
	Bloom's Taxonomy	AVE	0.0	0.0	7.0	0.0	0.0	0.0	0.0
	L,M,H conversion*				H				
Speaking AE2	CLOs		ILOs						
			Knowledge		Skills				Attitudes
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1							
	Skills (Level: 1-7)	2			7				
	Attitudes (Level: 1-5)	3							
	Contribution of CLOs to ILOs								
	Bloom's Taxonomy	AVE	0.0	0.0	7.0	0.0	0.0	0.0	0.0
	L,M,H conversion*				H				

Calculus 2	CLOs		ILOs						
			Knowledge		Skills				Attitudes
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1	4						
		2	4						
	Skills (Level: 1-7)	3					3		
		4					3		
	Attitudes (Level: 1-5)	5							
		.							
	Contribution of CLOs to ILOs								
	Bloom's Taxonomy	AVE	4.0	0.0	0.0	0.0	3.0	0.0	0.0
	L,M,H conversion*		H				M		
General Law	CLOs		ILOs						
			Knowledge		Skills				Attitudes
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1	3		2				
		2	3		2				
		3	3		2				
	Skill (Level: 1-7)	4					2		
	Attitudes (Level: 1-5)	5							5
	Contribution of CLOs to ILOs								
	Bloom's Taxonomy	AVE	3.0	0.0	2.0	0.0	2.0	0.0	5.0
	L,M,H conversion *		M		L		L		H

Critical Thinking	CLOs		ILOs						
			Knowledge		Skills				Attitudes
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1	3						
		2	2						
		3	3						
	Skills (Level: 1-7)	4					4		
	Attitudes (Level: 1-5)								
	Contribution of CLOs to ILOs								
	Bloom's Taxonomy	AVE	3.0	0.0	0.0	0.0	3.0	0.0	0.0
	L,M,H conversion*		M				M		
Fluid Mechanics	CLOs		ILOs						
			Knowledge		Skills				Attitudes
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1	3						
		2	3						
		3	3						
	Skills (Level: 1-7)	4							
		5					3		
		6							
	Attitudes (Level: 1-5)	7							
		8							
	Contribution of CLOs to ILOs								
	Bloom's Taxonomy	AVE	3.0	0.0	0.0	0.0	3.0	0.0	0.0
	L,M,H conversion*		M				M		

Fluid Mechanics Lab	CLOs		ILOs						
			Knowledge		Skills				Attitudes
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1	2						
		2	3						
		3	4						
	Skills (Level: 1-7)	4			2				
		5							
		6							
	Attitudes (Level: 1-5)	7							
8									
Contribution of CLOs to ILOs									
Bloom's Taxonomy	AVE	3.0	0.0	0.0	2.0	0.0	0.0	0.0	
L,M,H conversion*		M			L				

Chemistry Laboratory	CLOs		ILOs						
			Knowledge		Skills				Attitudes
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1	3						
		2							
		3							
	Skills (Level: 1-7)	4			3				
		5				2	3		
		6							
	Attitudes (Level: 1-5)	7							2
8									
Contribution of CLOs to ILOs									
Bloom's Taxonomy	AVE	3.0	0.0	0.0	3.0	2.0	3.0	2.0	
L,M,H conversion*		M			M	L	M	L	

HỌC KÌ III	
TÊN MÔN HỌC	

Introduction to Chemical Engineering	CLOs		ILOs						
			Knowledge		Skills				Attitudes
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1	3						
		2		3					
	Skills (Level: 1-7)	3				3			
		4					2		
	Attitudes (Level: 1-5)	5							2
	Contribution of CLOs to ILOs								
	Bloom's Taxonomy	AVE	3.0	0.0	0.0	3.0	2.0	3.0	2.0
	L,M,H conversion*		M			M	L	M	L
Inorganic Chemistry	CLOs		ILOs						
			Knowledge		Skills				Attitudes
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1	5						
		2		3					
		3							
	Skills (Level: 1-7)	4						2	
		5							
		6							
	Attitudes (Level: 1-5)	7							3
		8							
	Contribution of CLOs to ILOs								
	Bloom's Taxonomy	AVE	5.0	3.0	0.0	0.0	0.0	2.0	3.0
	L,M,H conversion*		H	M				L	M

Inorganic Chemistry Lab	CLOs		ILOs						
			Knowledge		Skills				Attitudes
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1	2						
		2							
		3							
	Skills (Level: 1-7)	4				2			
		5					3		
		6							
	Attitudes (Level: 1-5)	7							2
		8							
	Contribution of CLOs to ILOs								
	Bloom's Taxonomy	AVE	2.0	0.0	0.0	2.0	3.0	0.0	2.0
	L,M,H conversion*		L			L	M		L
Applied Statistics	CLOs		ILOs						
			Knowledge		Skills				Attitudes
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1	2						
		2		3					
		3							
	Skills (Level: 1-7)	4				2			
		5					2		
		6							
	Attitudes (Level: 1-5)	7							3
		8							
	Contribution of CLOs to ILOs								
	Bloom's Taxonomy	AVE	2.0	3.0	0.0	2.0	2.0	0.0	3.0
	L,M,H conversion*		L	M		L	L		M

Applied Statistics Lab	CLOs		ILOs						
			Knowledge		Skills				Attitudes
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1	2						
		2		3					
		3							
	Skills (Level: 1-7)	4				2			
		5					2		
		6							
	Attitudes (Level: 1-5)	7							3
		8							
	Contribution of CLOs to ILOs								
	Bloom's Taxonomy	AVE	2.0	3.0	0.0	2.0	2.0	0.0	3.0
	L,M,H conversion*		L	M		L	L		M
Engineering Drawing	CLOs		ILOs						
			Knowledge		Skills				Attitudes
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1	2	1					
	Skills (Level: 1-7)	2			3	3			
		3			3	3	3	3	
	Attitudes (Level: 1-5)	4							3
	Contribution of CLOs to ILOs								
	Bloom's Taxonomy	AVE	2.0	1.0	3.0	3.0	3.0	3.0	3.0
	L,M,H conversion*		L	L	M	M	M	M	M

Engineering Drawing Lab	CLOs		ILOs						
			Knowledge		Skills				Attitudes
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1	2	1					
	Skills (Level: 1-7)	2			3	3			
		3			3	3	3	3	
	Attitudes (Level: 1-5)	4							3
	Contribution of CLOs to ILOs								
	Bloom's Taxonomy	AVE	2.0	1.0	3.0	3.0	3.0	3.0	3.0
	L,M,H conversion*		L	L	M	M	M	M	M
Applied Mechanics	CLOs		ILOs						
			Knowledge		Skills				Attitudes
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1	4						
		2	1						
		3	3						
		4	4						
		5	3						
		6	1						
	Skills (Level: 1-7)	7				4			
	Attitudes (Level: 1-5)								
	Contribution of CLOs to ILOs								
	Bloom's Taxonomy	AVE	2.7	0.0	0.0	4.0	0.0	0.0	0.0
	L,M,H conversion*		L			H			

Political Economics of Marxism and Leninism	CLOs		ILOs						
			Knowledge		Skills				Attitudes
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1		1					
		2		1					
		3		1					
		4		1					
		5		1					
		6		1					
	Skills (Level: 1-7)	7				5			
	Attitudes (Level: 1-5)	8							
	Contribution of CLOs to ILOs								
Bloom’s Taxonomy	AVE	0.0	1.0	0.0	5.0	0.0	0.0	0.0	
L,M,H conversion*			L		H				
HỌC KÌ IV									
TÊN MÔN HỌC									
Analytical Chemistry 1	CLOs		ILOs						
			Knowledge		Skills				Attitudes
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1	3						
		2	3						
	Skills (Level: 1-7)	3			3			3	3
	Attitudes (Level: 1-5)	4							3
	Contribution of CLOs to ILOs								
Bloom’s Taxonomy	AVE	3.0	0.0	3.0	0.0	0.0	3.0	3.0	
L,M,H conversion*		M		M			M	M	

Physical Chemistry 1	CLOs		ILOs						
			Knowledge		Skills				Attitudes
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1	5	2					
	Skills (Level: 1-7)	2		3		4			
		3			3	3	5	3	
	Attitudes (Level: 1-5)	4							3
	Contribution of CLOs to ILOs								
	Bloom's Taxonomy	AVE	5.0	2.5	3.0	3.5	5.0	3.0	3.0
	L,M,H conversion*		H	L	M	M	H	M	M
Organic Chemistry 1	CLOs		ILOs						
			Knowledge		Skills				Attitudes
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1	3						
		2	4						
		3	2						
		4	3						
		5	3						
		6		2					
	Skills (Level: 1-7)	7	2						
		8		3					
		9			3				
		10			3				
	Attitudes (Level: 1-5)	11							2
		12							2
		13							2
		14							3
	Contribution of CLOs to ILOs								
	Bloom's Taxonomy	AVE	2.8	2.5	3.0	0.0	0.0	0.0	2.3
	L,M,H conversion*		L	L	M				L

Heat Transfer Operations	CLOs		ILOs						
			Knowledge		Skills				Attitudes
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1	5	3				3	
	Skills (Level: 1-7)	2			3	3		4	
		3		4	3	3	4		
	Attitudes (Level: 1-5)	4							3
	Contribution of CLOs to ILOs								
	Bloom's Taxonomy	AVE	5.0	3.5	3.0	3.0	4.0	3.5	3.0
	L,M,H conversion*		H	M	M	M	M	M	M
Philosophy of Marxism and Leninism	CLOs		ILOs						
			Knowledge		Skills				Attitudes
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1		1					
		2		1					
		3		1					
	Skills (Level: 1-7)	4				5			
	Attitudes (Level: 1-5)	5							
	Contribution of CLOs to ILOs								
	Bloom's Taxonomy	AVE	0.0	1.0	0.0	5.0	0.0	0.0	0.0
	L,M,H conversion*			L		H			

Internship 1	CLOs		ILOs						
			Knowledge		Skills				Attitudes
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1	3						
		2	3						
	Skill (Level: 1-7)	3			3				
		4						2	
		5					4		
	Attitudes (Level: 1-5)	6							4
	Contribution of CLOs to ILOs								
	Bloom's Taxonomy	AVE	3.0	0.0	3.0	0.0	4.0	2.0	4.0
	L,M,H conversion *		M		M		M	L	H
HỌC KỲ V									
MÔN HỌC									
Reaction Kinetics and Catalysis	CLOs		ILOs						
			Knowledge		Skills				Attitudes
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1	5						
		2		6					
		3							
	Skills (Level: 1-7)	4							
		5							
		6						4	
	Attitudes (Level: 1-5)	7							4
		8							
	Contribution of CLOs to ILOs								
	Bloom's Taxonomy	AVE	5.0	6.0	0.0	0.0	0.0	4.0	4.0
	L,M,H conversion*		H	H				H	H

Ho Chi Minh's Thoughts	CLOs		ILOs						
			Knowledge		Skills			Attitudes	
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1		1					
		2		1					
		3		1					
	Skills (Level: 1-7)	4				5			
	Attitudes (Level: 1-5)	5							
Contribution of CLOs to ILOs									
Bloom’s Taxonomy	AVE	0.0	1.0	0.0	5.0	0.0	0.0	0.0	
L,M,H conversion*			L		H				

Physical Chemistry 2	CLOs		ILOs						
			Knowledge		Skills			Attitudes	
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1	1						
		2	3						
		3	3						
	Skills (Level: 1-7)								
	Attitudes (Level: 1-5)	4							4
	Contribution of CLOs to ILOs								
	Bloom’s Taxonomy	AVE	2.3	0.0	0.0	0.0	0.0	0.0	4.0
	L,M,H conversion*		L						H

Physical Chemistry 2 Lab	CLOs		ILOs						
			Knowledge		Skills			Attitudes	
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1		2					
		2	3						
	Skills (Level: 1-7)	3				4	4		
		4				2	2		
		5				3	3		
	Attitudes (Level: 1-5)	6							3
	Contribution of CLOs to ILOs								
	Bloom’s Taxonomy	AVE	3.0	2.0	0.0	3.0	3.0	0.0	3.0
	L,M,H conversion*		M	L		M	M		M

Mass Transfer Operations	CLOs		ILOs						
			Knowledge		Skills				Attitudes
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1	5	3				3	
	Skills (Level: 1-7)	2		4	3	3	4		
		3		4	3	3	4	3	
	Attitudes (Level: 1-5)	4							3
	Contribution of CLOs to ILOs								
	Bloom's Taxonomy	AVE	5.0	3.7	3.0	3.0	4.0	3.0	3.0
	L,M,H conversion*		H	M	M	M	M	M	M
Organic Chemistry 2	CLOs		ILOs						
			Knowledge		Skills				Attitudes
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1	2						
	Skills (Level: 1-7)	2						3	
	Attitudes (Level: 1-5)	3						3	
	Contribution of CLOs to ILOs								
	Bloom's Taxonomy	AVE	2.0	0.0	0.0	0.0	0.0	3.0	0.0
	L,M,H conversion*		L					M	

Organic Chemistry Laboratory	CLOs		ILOs						
			Knowledge		Skills				Attitudes
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1	2						
		2	3						
		3	3						
		4	3						
	Skills (Level: 1-7)	5	2						
		6		2					
		7		2					
		8		3					
	Attitudes (Level: 1-5)	9							3
		10							2
	Contribution of CLOs to ILOs								
	Bloom's Taxonomy	AVE	2.6	2.3	0.0	0.0	0.0	0.0	2.5
	L,M,H conversion*		L	L					L
HỌC KỲ VI									
MÔN HỌC									
Computational Chemistry	CLOs		ILOs						
			Knowledge		Skills				Attitudes
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1	2						
		2	3						
		3	3						
	Skills (Level: 1-7)	4			3				
	Attitudes (Level: 1-5)	5							3
	Contribution of CLOs to ILOs								
	Bloom's Taxonomy	AVE	2.7	0.0	3.0	0.0	0.0	0.0	3.0
	L,M,H conversion*		L		M				M

Computational Chemistry Lab	CLOs		ILOs						
			Knowledge		Skills				Attitudes
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1	2						
		2	2						
		3	2						
	Skills (Level: 1-7)	4			3				
	Attitudes (Level: 1-5)	5							3
Contribution of CLOs to ILOs									
	Bloom's Taxonomy	AVE	2.0	0.0	3.0	0.0	0.0	0.0	3.0
	L,M,H conversion*		L		M				M
Mechanical Unit Operations	CLOs		ILOs						
			Knowledge		Skills				Attitudes
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1	5	3				3	
	Skills (Level: 1-7)	2			3	3		3	
		3		4	3	3	4	3	
	Attitudes (Level: 1-5)	4							3
Contribution of CLOs to ILOs									
	Bloom's Taxonomy	AVE	5.0	3.5	3.0	3.0	4.0	3.0	3.0
	L,M,H conversion*		H	M	M	M	M	M	M
Simulation and Optimization	CLOs		ILOs						
			Knowledge		Skills				Attitudes
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1	1						
		2	3						
	Skills (Level: 1-7)	3					4	4	
	Attitudes (Level: 1-5)	4							3
Contribution of CLOs to ILOs									
	Bloom's Taxonomy	AVE	2.0	0.0	0.0	0.0	4.0	4.0	3.0
	L,M,H conversion*		L				H	H	M

Simulation and Optimization Laboratory	CLOs		ILOs						
			Knowledge		Skills				Attitudes
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1	2						
		2	2						
	Skills (Level: 1-7)	3						4	
	Attitudes (Level: 1-5)	4							3
	Contribution of CLOs to ILOs								
	Bloom's Taxonomy	AVE	2.0	0.0	0.0	0.0	0.0	4.0	3.0
	L,M,H conversion*		L					H	M
Analytical Chemistry 2	CLOs		ILOs						
			Knowledge		Skills				Attitudes
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1	3						
		2	3						
	Skills (Level: 1-7)	3			3			3	3
	Attitudes (Level: 1-5)	4							3
	Contribution of CLOs to ILOs								
	Bloom's Taxonomy	AVE	3.0	0.0	3.0	0.0	0.0	3.0	3.0
	L,M,H conversion*		M		M			M	M
Research 1	CLOs		ILOs						
			Knowledge		Skills				Attitudes
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1	3						
		2	3						
		3	2						
	Skills (Level: 1-7)	4			4				
	Attitudes (Level: 1-5)	5							4
	Contribution of CLOs to ILOs								
	Bloom's Taxonomy	AVE	2.7	0.0	4.0	0.0	0.0	0.0	4.0
	L,M,H conversion*		L		M				H

Internship 2	CLOs		ILOs						
			Knowledge		Skills				Attitudes
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1		3					
	Skills (Level: 1-7)	2				6			
		3				2	2		
	Attitudes (Level: 1-5)	4							4
	Contribution of CLOs to ILOs								
	Bloom's Taxonomy	AVE	0.0	3.0	0.0	4.0	2.0	0.0	4.0
	L,M,H conversion*			M		H	L		H
HỌC KÌ VII									
MÔN HỌC									
Biochemistry	CLOs		ILOs						
			Knowledge		Skills				Attitudes
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1	2						
	Skills (Level: 1-7)	2			3	3		3	
	Attitudes (Level: 1-5)	3							3
	Contribution of CLOs to ILOs								
	Bloom's Taxonomy	AVE	2.0	0.0	3.0	3.0	0.0	3.0	3.0
	L,M,H conversion*		L		M	M		M	M

Biochemistry Laboratory	CLOs		ILOs						
			Knowledge		Skills				Attitudes
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1	2	2					
	Skills (Level: 1-7)	2			3	3	3		
	Attitudes (Level: 1-5)	3							3
	Contribution of CLOs to ILOs								
	Bloom's Taxonomy	AVE	2.0	2.0	3.0	3.0	3.0	0.0	3.0
	L,M,H conversion*		L	L	M	M	M		M
Process Instrumentation and Control	CLOs		ILOs						
			Knowledge		Skills				Attitudes
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1	4						
		2	5						
		3							
	Skills (Level: 1-7)	4							
		5					5		
		6							
	Attitudes (Level: 1-5)	7							3
		8							
	Contribution of CLOs to ILOs								
	Bloom's Taxonomy	AVE	4.5	0.0	0.0	0.0	5.0	0.0	3.0
	L,M,H conversion*		H				H		M

Chemical Reaction Engineering	CLOs		ILOs						
			Knowledge		Skills			Attitudes	
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1	6						
		2	1						
		3	5						
	Skills (Level: 1-7)	4				3			
	Attitudes (Level: 1-5)	5						4	
	Contribution of CLOs to ILOs								
	Bloom's Taxonomy	AVE	4.0	0.0	0.0	0.0	3.0	0.0	4.0
L,M,H conversion*		H				M		H	

Green Chemical Engineering	CLOs		ILOs						
			Knowledge		Skills			Attitudes	
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1	5						
		2		6					
		3							
	Skills (Level: 1-7)	4							
		5							
		6					5		
	Attitudes (Level: 1-5)	7							5
		8							
	Contribution of CLOs to ILOs								
	Bloom's Taxonomy	AVE	5.0	6.0	0.0	0.0	0.0	5.0	5.0
L,M,H conversion*		H	H				H	H	

Nanomaterials	CLOs		ILOs						
			Knowledge		Skills			Attitudes	
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1	1						
		2	3						
		3	4						
	Skills (Level: 1-7)	4					1		
		5			6				
	Attitudes (Level: 1-5)								
	Contribution of CLOs to ILOs								
	Bloom's Taxonomy	AVE	2.7	0.0	0.0	6.0	0.0	1.0	0.0
	L.M,H conversion*		L			H		L	

Biomaterials	CLOs		ILOs						
			Knowledge		Skills				Attitudes
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1	2						
		2	1						
		3	1						
		4	1						
		5	1						
	Skills (Level: 1-7)	6						3	
	Attitudes (Level: 1-5)	7							2
	Contribution of CLOs to ILOs								
	Bloom's Taxonomy	AVE	1.2	0.0	0.0	0.0	0.0	3.0	2.0
	L,M,H conversion*		L					M	L
Organic Chemistry Synthesis	CLOs		ILOs						
			Knowledge		Skills				Attitudes
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1	2						
		2	2						
		3	2						
	Skills (Level: 1-7)	4			4				
	Attitudes (Level: 1-5)	5							4
	Contribution of CLOs to ILOs								
	Bloom's Taxonomy	AVE	2.0	0.0	4.0	0.0	0.0	0.0	4.0
	L,M,H conversion*		L		M				H

Advanced Engineering Drawing	CLOs		ILOs						
			Knowledge		Skills				Attitudes
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1	3						
		2							
		3							
	Skills (Level: 1-7)	4							
		5					5		
		6							
	Attitudes (Level: 1-5)	7							3
		8							
	Contribution of CLOs to ILOs								
	Bloom's Taxonomy	AVE	3.0	0.0	0.0	0.0	5.0	0.0	3.0
	L,M,H conversion*		M				H		M
Advanced Engineering Drawing Lab	CLOs		ILOs						
			Knowledge		Skills				Attitudes
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1	3						
		2							
		3							
	Skills (Level: 1-7)	4							
		5					5		
		6							
	Attitudes (Level: 1-5)	7							3
		8							
	Contribution of CLOs to ILOs								
	Bloom's Taxonomy	AVE	3.0	0.0	0.0	0.0	5.0	0.0	3.0
	L,M,H conversion*		M				H		M

Environmental Chemistry 1	CLOs		ILOs						
			Knowledge		Skills				Attitudes
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1	4					3	
	Skills (Level: 1-7)	2	3	3			3		
		3		3	3	3	3	3	
	Attitudes (Level: 1-5)	4	3					3	3
	Contribution of CLOs to ILOs								
	Bloom's Taxonomy	AVE	3.3	3.0	3.0	3.0	3.0	3.0	3.0
	L,M,H conversion*		M	M	M	M	M	M	M
Environmental Chemistry 2	CLOs		ILOs						
			Knowledge		Skills				Attitudes
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1	4					3	
	Skills (Level: 1-7)	2	3	3			3		
		3		3	3	3	3	3	
	Attitudes (Level: 1-5)	4	3					3	3
	Contribution of CLOs to ILOs								
	Bloom's Taxonomy	AVE	3.3	3.0	3.0	3.0	3.0	3.0	3.0
	L,M,H conversion*		M	M	M	M	M	M	M

Heterogeneous Catalysis	CLOs		ILOs						
			Knowledge		Skills			Attitudes	
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1	4						
		2		5					
		3							
	Skills (Level: 1-7)	4							
		5							
		6						5	
	Attitudes (Level: 1-5)	7							3
8									
Contribution of CLOs to ILOs									
Bloom’s Taxonomy	AVE	4.0	5.0	0.0	0.0	0.0	5.0	3.0	
L,M,H conversion*		H	H				H	M	

Methods for Natural Products and Drugs	CLOs		ILOs						
			Knowledge		Skills			Attitudes	
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1	2						
		2	3						
		3	3						
	Skills (Level: 1-7)	4			2				
		5			3				
	Attitudes (Level: 1-5)	6							3
	Contribution of CLOs to ILOs								
	Bloom’s Taxonomy	AVE	2.7	0.0	2.5	0.0	0.0	0.0	3.0
	L,M,H conversion*		L		L				M

Methods for Natural Products and Drugs Lab	CLOs		ILOs						
			Knowledge		Skills			Attitudes	
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1	2						
		2	2						
		3	2						
	Skills (Level: 1-7)	4			3				
		5			4				
	Attitudes (Level: 1-5)	6							3
	Contribution of CLOs to ILOs								
	Bloom’s Taxonomy	AVE	2.0	0.0	3.5	0.0	0.0	0.0	3.0
	L,M,H conversion*		L		M				M

Pipping and Instruments System Design	CLOs		ILOs						
			Knowledge		Skills				Attitudes
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1	5						
		2		5					
		3							
	Skills (Level: 1-7)	4							
		5					5		
		6							
	Attitudes (Level: 1-5)	7							3
		8							
	Contribution of CLOs to ILOs								
	Bloom's Taxonomy	AVE	5.0	5.0	0.0	0.0	5.0	0.0	3.0
	L,M,H conversion*		H	H			H		M
Sustainable Energy	CLOs		ILOs						
			Knowledge		Skills				Attitudes
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1	2					3	
	Skills (Level: 1-7)	2	2	3			4	3	
		3		3	3	3	4		
	Attitudes (Level: 1-5)	4						3	2
	Contribution of CLOs to ILOs								
	Bloom's Taxonomy	AVE	2.0	3.0	3.0	3.0	4.0	3.0	2.0
	L,M,H conversion*		L	M	M	M	M	M	L

Natural Gas Processing	CLOs		ILOs						
			Knowledge		Skills				Attitudes
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1	5						
		2		5					
		3							
	Skills (Level: 1-7)	4							
		5							
		6						5	
	Attitudes (Level: 1-5)	7							3
		8							
	Contribution of CLOs to ILOs								
	Bloom's Taxonomy	AVE	5.0	5.0	0.0	0.0	0.0	5.0	3.0
	L,M,H conversion*		H	H				H	M
Bioinorganic Chemistry	CLOs		ILOs						
			Knowledge		Skills				Attitudes
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1	3						
		2		3					
		3	2						
	Skills (Level: 1-7)	4			3				
		5			3				
	Attitudes (Level: 1-5)	6							3
	Contribution of CLOs to ILOs								
	Bloom's Taxonomy	AVE	2.5	3.0	3.0	0.0	0.0	0.0	3.0
	L,M,H conversion*		L	M	M				M

Medicinal Chemistry	CLOs		ILOs						
			Knowledge		Skills				Attitudes
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1	4						
	Skills (Level: 1-7)	2			4	4		4	
	Attitudes (Level: 1-5)	3							3
	Contribution of CLOs to ILOs								
	Bloom's Taxonomy	AVE	4.0	0.0	4.0	4.0	0.0	4.0	3.0
	L,M,H conversion*		H		H	H		H	M
Treatment Plant Operation	CLOs		ILOs						
			Knowledge		Skills				Attitudes
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1	4						
		2		5					
		3							
	Skills (Level: 1-7)	4				5			
		5					5		
		6							
	Attitudes (Level: 1-5)	7							4
		8							
	Contribution of CLOs to ILOs								
	Bloom's Taxonomy	AVE	4.0	5.0	0.0	5.0	5.0	0.0	4.0
	L,M,H conversion*		H	H		H	H		H

Chemical Process Design and Simulation	CLOs		ILOs						
			Knowledge		Skills				Attitudes
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1	3						
		2	6						
		3	5						
	Skills (Level: 1-7)	4				6			
		5					2		
	Attitudes (Level: 1-5)	6							3
	Contribution of CLOs to ILOs								
	Bloom's Taxonomy	AVE	4.7	0.0	0.0	6.0	2.0	0.0	3.0
	L,M,H conversion*		H			H	L		M
Chemical Engineering Lab	CLOs		ILOs						
			Knowledge		Skills				Attitudes
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1	5	3				3	3
	Skills (Level: 1-7)	2			3	3	4	3	3
		3		4	3	3	4	3	
	Attitudes (Level: 1-5)	4						3	3
	Contribution of CLOs to ILOs								
	Bloom's Taxonomy	AVE	5.0	3.5	3.0	3.0	4.0	3.0	3.0
	L,M,H conversion*		H	M	M	M	M	M	M
Pre-thesis	CLOs		ILOs						
			Knowledge		Skills				Attitudes
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1	3		2				
		2	3		3				
		3	2		3				
	Skill (Level: 1-7)	4					5		
	Attitudes (Level: 1-5)	5							5
	Contribution of CLOs to ILOs								
	Bloom's Taxonomy	AVE	2.7	0.0	2.7	0.0	5.0	0.0	5.0
	L,M,H conversion *		L		L		H		H

Industrial Chemistry	CLOs		ILOs						
			Knowledge		Skills				Attitudes
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1	4						
		2		6					
		3							
	Skills (Level: 1-7)	4							
		5							
		6						5	
	Attitudes (Level: 1-5)	7							4
		8							
	Contribution of CLOs to ILOs								
	Bloom's Taxonomy	AVE	4.0	6.0	0.0	0.0	0.0	5.0	4.0
	L,M,H conversion*		H	H				H	H
Occupational Health Safety and Environment (HSE)	CLOs		ILOs						
			Knowledge		Skills				Attitudes
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1	5						
		2		3					
		3							
	Skills (Level: 1-7)	4							
		5							
		6						4	
	Attitudes (Level: 1-5)	7							3
		8							
	Contribution of CLOs to ILOs								
	Bloom's Taxonomy	AVE	5.0	3.0	0.0	0.0	0.0	4.0	3.0
	L,M,H conversion*		H	M				H	M

Research Methodology	CLOs		ILOs						
			Knowledge		Skills				Attitudes
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1	3						
		2	2						
	Skills (Level: 1-7)	3			4				
	Attitudes (Level: 1-5)	4							4
	Contribution of CLOs to ILOs								
	Bloom's Taxonomy	AVE	2.5	0.0	4.0	0.0	0.0	0.0	4.0
	L,M,H conversion*		L		M				H
Engineering Ethics and Professional Skills	CLOs		ILOs						
			Knowledge		Skills				Attitudes
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1		6					
	Skills (Level: 1-7)	2					4		
	Attitudes (Level: 1-5)	3							5
	Contribution of CLOs to ILOs								
	Bloom's Taxonomy	AVE	0.0	6.0	0.0	0.0	4.0	0.0	5.0
	L,M,H conversion*			H			H		H

Entrepreneurship	CLOs		ILOs						
			Knowledge		Skills				Attitudes
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1	2						
		2		3					
		3							
	Skills (Level: 1-7)	4				4			
		5							
		6							
	Attitudes (Level: 1-5)	7							3
		8							
	Contribution of CLOs to ILOs								
	Bloom's Taxonomy	AVE	2.0	3.0	0.0	4.0	0.0	0.0	3.0
	L,M,H conversion*		L	M		H			M
Engineering Project Management	CLOs		ILOs						
			Knowledge		Skills				Attitudes
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1		6					
		2		6					
	Skills (Level: 1-7)	3				6			
	Attitudes (Level: 1-5)	4							5
	Contribution of CLOs to ILOs								
	Bloom's Taxonomy	AVE	0.0	6.0	0.0	6.0	0.0	0.0	5.0
	L,M,H conversion*			H		H			H

Introduction to Business Administration	CLOs		ILOs						
			Knowledge		Skills				Attitudes
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1		1					
		2		1					
		3		1					
		4		1					
		5		1					
		6		1					
		7		1					
		8		1					
	Skills (Level: 1-7)								
	Attitudes (Level: 1-5)								
Contribution of CLOs to ILOs									
Bloom’s Taxonomy	AVE	0.0	1.0	0.0	0.0	0.0	0.0	0.0	
L,M,H conversion*			L						

Entrepreneurship and Small Business Management	CLOs		ILOs						
			Knowledge		Skills				Attitudes
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1		1					
	Skills (Level: 1-7)	2					1		
		3					1		
	Attitudes (Level: 1-5)	4						1	
Contribution of CLOs to ILOs									
Bloom’s Taxonomy	AVE	0.0	1.0	0.0	0.0	0.0	1.0	1.0	
L,M,H conversion*			L				L	L	

Internship 3	CLOs		ILOs						
			Knowledge		Skills				Attitudes
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1		3					
	Skills (Level: 1-7)	2				6			
		3				2	2		
	Attitudes (Level: 1-5)	4							4
Contribution of CLOs to ILOs									
	Bloom's Taxonomy	AVE	0.0	3.0	0.0	4.0	2.0	0.0	4.0
	L,M,H conversion*			M		H	L		H
Thesis	CLOs		ILOs						
			Knowledge		Skills				Attitudes
			1	2	3	4	5	6	7
	Knowledge (Level: 1-6)	1	4						
		2	4						
	Skills (Level: 1-7)	3			4				
	Attitudes (Level: 1-5)	4							5
Contribution of CLOs to ILOs									
	Bloom's Taxonomy	AVE	4.0	0.0	4.0	0.0	0.0	0.0	5.0
	L,M,H conversion*		M		M				H

⁽⁴⁾Cột “Tên môn học”: liệt kê tất cả các môn học của CTĐT được phân bố theo học kỳ. Mỗi môn học, cần xác định rõ mức độ đóng góp vào các CDR tương ứng, và thống nhất với thông tin được xác định trong đề cương môn học. Đối với nhóm môn học tự chọn, trình độ năng lực với các CDR phải tương ứng nhau.

⁽⁵⁾Cột “Chuẩn đầu ra của CTĐT”: liệt kê tất cả CDR của CTĐT. Chỉ lần liệt kê dưới dạng PLOi, không ghi nội dung cụ thể CDR.

12. Mô tả vắn tắt nội dung và khối lượng các môn học

STT	Mã môn học	Tên môn học (MH)		Tín chỉ		MH Tiên quyết (TQ), MH Song hành (SH), MH Trước (HT)	Mô tả nội dung môn học
		Tiếng Anh	Tiếng Việt	Tổng TC	Lý thuyết (LT)/ Thực hành (TH)		
1	PE015IU	Philosophy of Marxism and Leninism	Triết học Mác-Lênin	3	LT	SH: Kinh tế chính trị Mác-Lênin	Môn học trang bị cho sinh viên những nội dung cơ bản về thế giới quan, phương pháp luận chính trị Mác-Lênin. Giúp sinh viên vận dụng những tri thức về thế giới quan, phương pháp luận triết học Mác-Lênin một cách sáng tạo trong hoạt động khoa học và thực tiễn, nhằm giải quyết những vấn đề mà đời sống xã hội của đất nước, của thời đại đang đặt ra.
2	PE016IU	Political economics of Marxism and Leninism	Kinh tế chính trị Mác-Lênin	2	LT	SH: Triết học Mác-Lênin	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 sở hữu nền kinh tế thị trường; Sản xuất giá trị thặng dư trong nền kinh tế thị trường; trong Cuộc tranh và độc quyền trong nền kinh tế thị trường; Kinh tế thị trường định hướng xã hội chủ nghĩa và các quan hệ có lợi cho kinh tế ở Việt Nam; Công nghiệp hóa, hiện đại hóa và hội nhập kinh tế quốc tế tại Việt Nam.
3	PE017IU	Scientific socialism	Chủ nghĩa xã hội khoa học	2	LT	HT: Triết học Mác-Lênin	Môn học trang bị cho sinh viên những nội dung cơ bản của chủ nghĩa xã hội khoa học, 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.
4	PE018IU	History of Vietnamese Communist Party	Lịch sử Đảng Cộng Sản Việt Nam	2	LT	HT: Chủ nghĩa xã hội khoa học	Môn học trang bị cho sinh viên những kiến thức cơ bản về Lịch sử Đảng Cộng sản Việt Nam; sự ra đời (1920-1930), sự lãnh đạo của Đảng đối với cách mạng Việt Nam (1930-1945), trong hai cuộc kháng chiến chống thực dân Pháp và đế quốc Mỹ (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); xây dựng ý thức tôn trọng sự thật khách quan, nâng cao lòng tự hào, niềm tin đối với sự nghiệp lãnh đạo của Đảng

5	PE019IU	Ho Chi Minh's Thoughts	Tư tưởng HCM	2	LT	HT: Chủ nghĩa xã hội khoa 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 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.
6	PE021IU	General Law	Pháp luật đại cương	3	LT		Giới thiệu về hệ thống pháp luật Việt Nam. Cung cấp cho sinh viên kiến thức về quyền và nghĩa vụ của mình trong Hiến pháp, Luật Hình sự, Hành chính, Dân sự, Luật Lao động và Luật Doanh nghiệp ở Việt Nam. Từ đó sinh viên hiểu hơn về nghĩa vụ của mình trong việc đảm bảo công bằng xã hội.
7	PE008IU	Critical Thinking	Tư duy phân tích	3	LT		Môn học cung cấp sinh viên những kiến thức nền về tư duy phân tích, kỹ năng hữu ích đối với mọi đối tượng ngành nghề. Sinh viên thực hành với các dạng lý luận, phân tích, đánh giá các lý luận của mình và của người khác. Sinh viên được hỗ trợ các phương pháp tìm kiếm thông tin để lý luận và kiểm định lý luận.
8	PE020IU	Engineering Ethics and Professional Skills	Đạo đức và kỹ năng nghề nghiệp	3	LT		Khóa học này được thiết kế nhằm cung cấp cho sinh viên các ngành kỹ thuật lý thuyết và thực hành đạo đức kỹ sư. Môn học giúp sinh viên khám phá mối quan hệ giữa đạo đức và kỹ thuật, áp dụng lý thuyết đạo đức cổ điển để giải quyết các vấn đề kỹ thuật gặp phải trong nghề nghiệp.
9	EN007IU	Writing AE1	Tiếng Anh chuyên ngành 1 (kỹ năng viết)	2	LT		Môn học nhằm nâng cao kỹ năng viết trình độ tiên 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.
10	EN008IU	Listening AE1	Tiếng Anh chuyên ngành 1 (kỹ năng nghe)	2	LT		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 dồi thêm vốn từ vựng học thuật.

11	EN011IU	Writing AE2	Tiếng Anh chuyên ngành 2 (kỹ năng viết)	2	LT		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.
12	EN012IU	Speaking AE2	Tiếng Anh chuyên ngành 2 (kỹ năng nói)	2	LT		Môn học cung cấp cho sinh viên các chiến lược thiết thực sử dụng trong việc thuyết trình. Ngoài 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.
13	MA001IU	Calculus 1	Toán 1	4	LT		Hàm số, Giới hạn, Tính liên tục, Đạo hàm, Đạo hàm cho các hàm cơ bản, Quy 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.
14	MA003IU	Calculus 2	Toán 2	4	LT	HT: Toán 1	Khóa học trang bị cho sinh viên kiến thức về dãy số và chuỗi số, Hàm véc tơ, Hàm nhiều biến, tích phân nhiều lớp và các ứng dụng của chúng
15	PH013IU	Physics 1 - Mechanics	Vật lý 1	2	LT		Khảo sát động học, động lực học, năng lượng học của chuyển động của chất điểm và của vật rắn.
16	CH011IU	Chemistry for Engineers	Hóa đại cương	3	LT		Môn học được thiết kế cho sinh viên kỹ thuật hoặc sinh viên đang đọc những ngành không phải chuyên ngành Hóa học như Công nghệ thông tin, Công nghệ sinh học, Kỹ thuật xây dựng, Kỹ thuật y sinh, Kỹ thuật điện tử và truyền thông, Kỹ thuật môi trường. Môn học sẽ giới thiệu những nguyên lý cơ bản của Hóa học và kết nối những nguyên lý đó với những vấn đề của ngành kỹ thuật. Phần thực hành không bao gồm trong môn học này.
17	CH012IU	Chemistry Laboratory	Thực hành Hóa đại cương	1	TH	HT: Hóa đại cương	Môn học này giới thiệu cho sinh viên kiến thức cơ bản về an toàn phòng thí nghiệm cơ bản, kỹ thuật và thiết bị, đồng thời bổ sung kiến thức trong bài giảng. Trước mỗi thí nghiệm, sinh viên phải đọc hướng dẫn thí và hoàn thành báo cáo trước thí nghiệm. Tất cả sinh viên phải hoàn thành khóa huấn luyện an toàn bắt buộc để tham gia khóa học, sẽ được cung cấp vào ngày đầu tiên của lớp học. Sinh viên phải đến từng ngày thí nghiệm đúng giờ và sẵn sàng thực hiện các nhiệm vụ trong ngày.
18	ENEE1014IU	Engineering Drawing	Vẽ kỹ thuật	2	LT		Môn học này nhằm cung cấp khả năng hiểu các ý tưởng kỹ thuật về sơ đồ kỹ thuật, kỹ năng xây dựng bản vẽ kỹ thuật tuân thủ TCVN và ISO bằng tay và sử dụng phần mềm AutoCAD.

19	ENEE1015IU	Engineering Drawing Lab	Thực hành Vẽ kỹ thuật	1	TH	SH: Vẽ Kỹ thuật	Khóa học cung cấp kiến thức về việc sử dụng kỹ thuật hình học với các công cụ vẽ và phần mềm AutoCAD, tiêu chuẩn trình bày bản vẽ kỹ thuật; cơ sở, tiêu chuẩn, xây dựng và kỹ năng phân tích, hiểu biểu đồ vẽ.
20	ENEE1019IU	Applied Statistics	Thống kê ứng dụng	2	LT	HT: Toán 1	Môn học này được thiết kế cho sinh viên theo đuổi bằng cấp về kỹ thuật hóa học/môi trường và cung cấp kiến thức về dữ liệu thống kê, dữ liệu đồ thị, thống kê mô tả, xác suất và phân phối, kiểm tra giả thuyết, phân tích phương sai (ANOVA), phân tích và dự báo chuỗi thời gian.
21	ENEE1020IU	Applied Statistics Lab	Thực hành Thống kê ứng dụng	1	TH	SH: Thống kê ứng dụng	Môn học này được thiết kế cho sinh viên theo học ngành kỹ thuật hóa học/môi trường và cung cấp kiến thức cũng như kỹ năng sử dụng phần mềm Python/R để vẽ dữ liệu, thống kê mô tả, kiểm tra giả thuyết, phân tích phương sai (ANOVA), phân tích chuỗi thời gian và dự báo.
22	CHE0011IU	Applied Mechanics	Cơ ứng dụng	2	LT	HT: Vật lý 1 HT: Toán 1	Môn học này trình bày kiến thức cơ bản về điều kiện cân bằng của hệ thống lực và kiến thức, kỹ năng về phương pháp tính toán cường độ của các vấn đề vật liệu: Căng và nén, xoắn, uốn mặt phẳng, uốn kết hợp và xoắn; và kiến thức về truyền tải đai, xích, bánh răng, trục và trục truyền động (vòng bi) trong kỹ thuật.
23	CE205IU	Fluid Mechanics	Cơ học lưu chất	2	LT		Khóa học này sẽ cung cấp kiến thức cơ bản về tính chất vật lý của chất lỏng và đặc tính của nó. Hơn nữa, học sinh học các định luật và phương trình chi phối đại diện cho các loại chất lỏng khác nhau ở cả trạng thái tĩnh và chuyển động tương tác với các cấu trúc; và biết cách giải các phương trình này hoặc tính toán các tham số vật lý theo ý nghĩa thực tế. Ngoài ra, các thực hành để đo tính chất chất lỏng được giới thiệu trong khóa học này.
24	CE206IU	Fluid Mechanics Lab	Thực hành cơ học lưu chất	1	TH	SH: Cơ học lưu chất	Khóa học này chủ yếu được sử dụng như một phòng thí nghiệm giảng dạy đại học. Các bài tập thực nghiệm sẽ được cung cấp cho sinh viên để chứng minh lý thuyết được đưa ra trong các bài giảng trên lớp. Các thí nghiệm này được thiết kế để kiểm tra một số tính chất của chất lỏng và tiến hành các thí nghiệm liên quan đến các hiện tượng nguyên tắc của dòng chảy (nước) không nén được, chẳng hạn như: dòng chảy qua đập nước, tổn thất đầu dòng chảy trong đường ống
25	IT120IU	Entrepreneurship	Khởi nghiệp	3	LT		Giới thiệu về các hoạt động quản lý sáng tạo và đổi mới của tinh thần kinh doanh thành công.

26	ENEE4011IU	Engineering Project Management	Quản lý dự án kỹ thuật	3	LT		Khóa học này được phát triển để cung cấp khái niệm chính về quản lý dự án được đặc trưng bởi cơ quan quản lý dự án hướng dẫn kiến thức (PMBOK Guide). Hướng dẫn này nhấn mạnh năm nhóm quy trình dự án về khởi xướng, lập kế hoạch, thực hiện, kiểm soát và kết thúc, và chín lĩnh vực kiến thức về tích hợp dự án, phạm vi, thời gian, chi phí, chất lượng, nguồn nhân lực, truyền thông, rủi ro và quản lý mua sắm.
27	BA115IU	Introduction to Business Administration	Quản trị học	3	LT		Sử dụng phương pháp học tập tương tác và giảng dạy dựa trên vấn đề, khóa học này nhấn mạnh sự tương tác giữa giảng viên và sinh viên. Các phiên thuyết trình và thảo luận bao gồm các nghiên cứu điển hình của công ty cũng như trả lời một số câu hỏi lý thuyết và khái niệm, giúp sinh viên thấy các khái niệm được áp dụng như thế nào trong bối cảnh kinh doanh thực tế. Học sinh sẽ trình bày trường hợp này trước lớp và thảo luận với các bạn cùng trang lứa. Các diễn giả khách mời được mời nói về các chủ đề được lựa chọn hoặc trải nghiệm thực tế.
28	BA154IU	Entrepreneurship and Small Business Management	Sáng lập doanh nghiệp	3	LT		Khóa học này nhằm mục đích cung cấp một giới thiệu thực hành về quá trình tạo liên doanh có thể mở rộng cho sinh viên có hứng thú mạnh mẽ với tinh thần kinh doanh. Khóa học được thiết kế cho nhiều sở thích của sinh viên. Nó trực tiếp giải quyết các mối quan tâm của sinh viên muốn trở thành doanh nhân trong tương lai gần hoặc xa hơn. Nó cũng hữu ích cho bất cứ ai mong muốn được tương tác với các doanh nhân trong sự nghiệp kinh doanh của họ. Cuối cùng, khóa học này hữu ích cho bất kỳ ai có đầu óc tò mò và sẵn sàng kết hợp phân tích nghiêm túc với tư duy sáng tạo.
29	CHE1011IU	Introduction to Chemical Engineering	Nhập môn kỹ thuật hóa học	2	LT		Khóa học này sẽ giới thiệu cho sinh viên về nghề kỹ thuật và lĩnh vực kỹ thuật hóa học, hướng dẫn sinh viên thông qua các nguyên tắc thiết kế kỹ thuật và giải quyết vấn đề, đồng thời giúp sinh viên phát triển kỹ năng làm việc nhóm, quản lý thời gian và giao tiếp.
30	CHE2103IU	Inorganic Chemistry	Hóa vô cơ	3	LT	HT: Hóa đại cương	Khóa học này được thiết kế để cung cấp cho sinh viên kiến thức và hiểu biết rộng về tính chất nguyên tử, cấu trúc phân tử và tính chất của các phức hợp và hợp chất vô cơ.

31	CHE2104IU	Inorganic Chemistry Lab	Thực hành Hóa vô cơ	1	TH	SH: Hóa vô cơ	Khóa học sẽ giới thiệu cho sinh viên về an toàn phòng thí nghiệm cơ bản, kỹ thuật và bộ máy, đồng thời bổ sung kiến thức thu được trong các bài giảng Hóa học vô cơ. Trước mỗi phòng thí nghiệm, sinh viên phải đọc hướng dẫn sử dụng phòng thí nghiệm về thí nghiệm và hoàn thành báo cáo trước phòng thí nghiệm. Tất cả học sinh phải hoàn thành khóa đào tạo an toàn bắt buộc để tham gia khóa học, sẽ được cung cấp vào ngày đầu tiên của lớp học. Học sinh phải đến từng phòng thí nghiệm đúng giờ và chuẩn bị để thực hiện các nhiệm vụ trong ngày.
32	CHE1081IU	Organic Chemistry 1	Hóa hữu cơ 1	3	LT	HT: Hóa đại cương	Khóa học này được thiết kế đặc biệt cho sinh viên Kỹ thuật Hóa học. Đây là phần đầu tiên của khóa học 2 học kỳ về Hóa học hữu cơ. Mô-đun đặc biệt này cung cấp thông tin cơ bản về các khía cạnh của hóa học lập thể và những điều cơ bản của phản ứng cộng, thay thế và loại bỏ, nhóm chức, hợp chất dị vòng bão hòa và thơm.
33	CHE1091IU	Organic Chemistry 2	Hóa hữu cơ 2	3	LT	HT: Hóa hữu cơ 1	Khóa học này được thiết kế đặc biệt cho sinh viên Kỹ thuật Hóa học. Đây là phần thứ hai của khóa học 2 học kỳ về Hóa học hữu cơ. Mô-đun đặc biệt này cung cấp thông tin cơ bản về các nhóm chức năng, cơ chế phản ứng chung của chúng với sự nhấn mạnh sinh học.
34	CHE1092IU	Organic Chemistry Laboratory	Thực hành Hóa hữu cơ	2	0	HT: Hóa hữu cơ 2	Khóa học sẽ cung cấp cho sinh viên các kỹ năng phòng thí nghiệm được sử dụng trong các kỹ thuật phân tích hóa học cổ điển và dụng cụ. Học sinh cũng sẽ học cách phân tích dữ liệu, thực hiện phân tích thống kê và giải thích kết quả.
35	CHE1051IU	Analytical Chemistry 1	Hóa phân tích 1	3	LT		Khóa học này bao gồm các nguyên tắc cơ bản của phân tích hóa học tập trung vào các kỹ thuật truyền thống. Các sinh viên sẽ được cung cấp phạm vi và sử dụng các phương pháp phân tích cổ điển trong phân tích định tính và định lượng và cũng với các phương pháp thống kê trong đánh giá chất lượng dữ liệu đo lường phân tích và giải thích tầm quan trọng của chúng, xác nhận các phương pháp và kết quả phân tích. Học sinh sẽ phát triển các kỹ năng trong các nhiệm vụ phân tích, tư duy phê phán và kỹ năng giải quyết vấn đề. Học sinh sẽ hiểu trách nhiệm chuyên môn và an toàn nằm trong làm việc về phân tích hóa học.

36	CHE1061IU	Analytical Chemistry 2	Hóa phân tích 2	3	LT	HT: Hóa đại cương HT: Hóa phân tích 1	Khóa học này bao gồm các nguyên tắc cơ bản của phân tích hóa học với trọng tâm là các kỹ thuật hiện đại. Các sinh viên sẽ được cung cấp phạm vi và sử dụng các phương pháp phân tích hiện đại trong phân tích định tính và định lượng. Các kỹ thuật được sử dụng trong việc tách mẫu cũng sẽ được giới thiệu. Học sinh sẽ phát triển các kỹ năng trong các nhiệm vụ phân tích, tư duy phê phán và kỹ năng giải quyết vấn đề. Học sinh sẽ hiểu trách nhiệm chuyên môn và an toàn nằm trong làm việc về phân tích hóa học.
37	CHE1062IU	Analytical Chemistry Laboratory	Thực hành Hóa phân tích	2	0	SH: Hóa phân tích 2	Khóa học sẽ cung cấp cho sinh viên các kỹ năng phòng thí nghiệm được sử dụng trong các kỹ thuật phân tích hóa học cổ điển và dụng cụ. Học sinh cũng sẽ học cách phân tích dữ liệu, thực hiện phân tích thống kê và giải thích kết quả.
38	CHE1031IU	Physical Chemistry 1	Hóa lý 1	3	LT	HT: Toán 2	Khóa học cung cấp cho sinh viên kiến thức căn bản về nhiệt động học kỹ thuật hóa học bao gồm nhiệt động học, cân bằng hóa học và cân bằng pha. Kiến thức trong khóa học này sẽ được phát triển thêm trong các khóa học cơ bản khác cũng như các khóa học chuyên ngành trong chương trình kỹ thuật hóa học.
39	CHE1043IU	Physical Chemistry 2	Hóa lý 2	2	LT	HT: Hóa lý 1	Khóa học được thiết kế cho sinh viên kỹ thuật hóa học cung cấp cho sinh viên nền tảng cần thiết về động học hóa học, điện hóa học, hiện tượng bề mặt và xúc tác. Ngoài ra, sau 10 tuần cho các bài giảng trên lớp, phần thí nghiệm 5 tuần liên quan đến tất cả các nội dung của hóa lý sẽ được tổ chức vào thời gian còn lại.
40	CHE1044IU	Physical Chemistry 2 Lab	Thực hành hóa lý 2	1	0	SH: Hóa lý 2	Khóa học này sẽ giới thiệu cho sinh viên các phương pháp thực nghiệm trong hóa lý, phân tích hóa học và các nguyên tắc và ứng dụng của thiết bị hóa học. Khóa học sẽ làm quen với sinh viên hành vi của các hệ thống hóa học thực sự, lý thuyết về hiện tượng hóa học đang được quan sát và thiết kế và phương pháp luận của các hệ thống đo lường để phát hiện hiện tượng hóa học.
41	CHE1104IU	Biochemistry	Hóa sinh	3	LT	HT: Hóa đại cương	Môn học được thiết kế để cung cấp cho sinh viên các khái niệm cơ bản trong hóa sinh và giới thiệu về các chất chuyển hóa xảy ra trong các sinh vật sống để hiểu cơ bản phân tử của sự sống. Các chủ đề của môn học sẽ bao gồm động học enzyme và cơ chế và chuyển hóa của các phân tử sinh học quan trọng như carbohydrate, axit béo, axit amin, tập trung vào con đường thoái hóa của chúng.

42	CHE1105IU	Biochemistry Lab	Thực hành Hóa sinh	1	TH	SH: Hóa sinh	Môn học được thiết kế để cung cấp cho sinh viên các khái niệm cơ bản trong hóa sinh và giới thiệu về các chất chuyển hóa xảy ra trong các sinh vật sống để hiểu cơ bản phân tử của sự sống. Các kỹ thuật và phương pháp tiếp cận được sử dụng trong nghiên cứu sinh hóa sẽ được trình bày trong môn học này.
43	CHE1021IU	Process Instrumentation and Control	Đo lường và điều khiển quá trình	2	LT	HT: Nhập môn kỹ thuật hóa học	Khóa học giới thiệu khái niệm cơ bản về lý thuyết điều khiển cũng như các khía cạnh thực tế của các vòng điều khiển quá trình. Mô hình lý thuyết của các quá trình hóa học, một bước cần thiết để thiết kế bộ điều khiển quá trình, và các bài tập thực hành, mô tả các dụng cụ xử lý tạo thành các vòng điều khiển công nghiệp. Nguyên tắc đo cho các cảm biến đo nhiệt độ, áp suất, mức chất lỏng, lưu lượng và thành phần được mô tả ngắn gọn với hướng dẫn về cách chọn loại cảm biến thích hợp. Kiến thức thực tế để thiết kế và điều chỉnh bộ điều khiển PID, và các ví dụ minh họa.
44	CHE1111IU	Industrial Chemistry	Hóa học công nghiệp	2	LT	HT: Hóa đại cương HT: Động học phản ứng và xúc tác	Khóa học này sẽ cung cấp cho sinh viên những kỹ năng và kiến thức cần thiết liên quan đến hóa học công nghiệp. Các chủ đề được đề cập bao gồm các quy trình xúc tác đồng nhất và không đồng nhất, quy trình sản xuất hóa chất vô cơ, chất hoạt động bề mặt, sơn và lớp phủ, Quy trình trong Nhà máy lọc dầu, quy trình sản xuất olefin và polymer, giới thiệu về pin.
45	CHE2011IU	Reaction Kinetics and Catalysis	Động học phản ứng và xúc tác	3	LT		Khóa học này cung cấp cho sinh viên kiến thức chính về xúc tác đồng nhất và không đồng nhất. Khóa học bao gồm định nghĩa về xúc tác, hấp phụ-giải hấp, diện tích bề mặt và độ xốp; Động học Langmuir-Hinshelwood, mô hình động học; đặc tính của xúc tác; và lý thuyết tốc độ phản ứng.
46	CHE2024IU	Computational Chemistry	Hóa tính toán	2	LT	HT: Hóa đại cương	Khóa học đề cập đến các tính toán dựa trên máy tính trong hóa học. Khóa học tích hợp lý thuyết với các yếu tố tính toán thực tế được áp dụng trong các lĩnh vực hóa học môi trường, hóa học protein và hóa dược. Các sinh viên dự kiến sẽ có được kiến thức về hóa học lượng tử, cơ học phân tử và đặc tính lý thuyết của các phân tử và các phương pháp ứng dụng để tính toán cấu trúc hình học và điện tử của các phân tử.
47	CHE2025IU	Computational Chemistry lab	Thực hành hóa tính toán	1	TH	HT: Hóa tính toán	Khóa học bao gồm ứng dụng thực tế của các khái niệm quan trọng trong hóa học lượng tử và cơ học phân tử. Các khái niệm trung tâm cho ứng dụng dựa trên máy tính của các phân tử hữu cơ trong hóa học lượng tử sẽ được mô tả và thảo luận. Trọng tâm trong cơ học phân tử là mô tả và thảo luận về ứng dụng thực tế của các phân tử hữu cơ, bao gồm cả protein.

48	CHE2034IU	Simulation and Optimization	Mô phỏng và tối ưu hóa	2	LT		Khóa học này nhằm giới thiệu cho sinh viên cách sử dụng phương pháp và kỹ thuật định lượng để đưa ra quyết định một cách hiệu quả; thiết lập và ứng dụng mô hình trong việc giải quyết các vấn đề quyết định của kinh doanh.
49	CHE2035IU	Simulation and Optimization Lab	Thực hành Mô phỏng và tối ưu hóa	1	TH	SH: Mô phỏng và tối ưu hóa	Khóa học này tạo điều kiện cho sinh viên thực hành ứng dụng các phương pháp và kỹ thuật OR để giải quyết vấn đề trong thực tế. Sinh viên sẽ học cách mô hình hóa và tối ưu hóa các vấn đề, phân tích dữ liệu và triển khai các thuật toán OR.
50	CHE2041IU	Mass Transfer Operations	Quá trình và thiết bị truyền khối	3	LT	HT: Quá trình và thiết bị truyền nhiệt	Quá trình truyền khối lượng rất quan trọng trong kỹ thuật hóa học vì nó là phương pháp để tách hoặc làm sạch các thành phần trong hỗn hợp. Qua khóa học này, sinh viên sẽ học về nguyên lý truyền khối lượng và ứng dụng của nó. Khóa học tích hợp động lực học chất lưu và nhiệt động học để phát triển biểu thức tốc độ cho quá trình truyền khối lượng trong hệ thống đa pha và đa thành phần. Dựa trên định luật Fick và quy tắc cân bằng pha, khóa học cung cấp kiến thức về thiết kế các quy trình tách lớn như chưng cất, chiết xuất, làm khô, tách và hấp thụ để lựa chọn hoặc loại bỏ các thành phần cụ thể từ hỗn hợp.
51	CHE2051IU	Heat Transfer Operations	Quá trình và thiết bị truyền nhiệt	3	LT		Môn học này sẽ giới thiệu các khái niệm cơ bản về các chế độ truyền nhiệt khác nhau: truyền nhiệt qua dẫn, truyền nhiệt qua lưu và truyền nhiệt qua bức xạ. Nó sẽ phát triển những khái niệm này với các lý thuyết và ứng dụng để giải quyết các vấn đề kỹ thuật hóa học thực tế. Một số khía cạnh về nguyên tắc thiết kế quá trình của các thiết bị truyền nhiệt khác nhau sẽ được đề cập trong phần sau của khóa học này. Cuối cùng, để trình bày một hình ảnh vật lý về quá trình lưu chất, truyền nhiệt trong luồng biên giới sẽ được thảo luận. Mặc dù khóa học được thiết kế chủ yếu để đáp ứng yêu cầu của một khóa học kỹ thuật hóa học truyền nhiệt dành cho sinh viên đại học, nó cũng hữu ích cho các kỹ sư đang làm việc để làm mới kiến thức cơ bản và kỹ thuật.

52	CHE2061IU	Chemical Reaction Engineering	Kỹ thuật phản ứng	3	LT	HT: Hóa lý 2 HT: Các quá trình và thiết bị cơ học	Các nguyên tắc cơ bản của động học hóa học, cũng như phân tích và thiết kế lò phản ứng, được đề cập chi tiết và chuyên sâu trong khóa học này. Động học hóa học bao gồm nhiều chủ đề khác nhau, bao gồm hằng số tốc độ, thứ tự phản ứng, phương trình tốc độ cho cả quy trình đơn giản và phức tạp, phân tích dữ liệu động học và phân phối sản phẩm. Các lĩnh vực nghiên cứu chính trong phân tích và thiết kế lò phản ứng liên quan đến các hệ thống và cấu hình lò phản ứng lý tưởng, chẳng hạn như lò phản ứng hàng loạt, lò phản ứng dòng chảy cầm và lò phản ứng bể khuấy liên tục. Phần cuối cùng của khóa học thảo luận về các phản ứng xúc tác đồng nhất và không đồng nhất. Thành phần thiết kế bao gồm cách kích thước các lò phản ứng như vậy, tính toán mức độ chuyển đổi ở các nhiệt độ và áp suất khác nhau và xác định động học phản ứng từ dữ liệu thí nghiệm. Nó cũng bao gồm cách chọn loại lò phản ứng tốt nhất và các thông số vận hành để tối đa hóa việc sản xuất một sản phẩm mong muốn.
53	CHE2071IU	Mechanical Unit Operations	Các quá trình và thiết bị cơ học	3	LT	HT: Vật lý 1 Toán 2, Quá trình và thiết bị truyền khối	Trong các quy trình kỹ thuật hóa học, việc làm việc với chất lỏng và hạt rắn trong hỗn hợp là khá phổ biến. Trong môn học này, sinh viên được cung cấp kiến thức cơ bản về kỹ thuật hóa học trong cơ học chất lỏng và hoạt động quá trình cơ khí cho các hệ thống không đồng nhất. Môn học này là một phần quan trọng trong nền tảng của một kỹ sư hóa học.
54	CHE2081IU	Occupational Introduction to Health Safety and Environment	Giới thiệu về an toàn sức khỏe và môi trường	2	LT		Khóa học giới thiệu cho sinh viên về việc áp dụng các khái niệm về an toàn sức khỏe và môi trường (HSE) trong kỹ thuật, nhấn mạnh vào việc quản lý rủi ro liên quan đến bất kỳ sản phẩm và quy trình nguy hiểm nào trong suốt vòng đời của nó. Việc thực hiện chương trình HSE là để giảm thiểu và kiểm soát rủi ro đến từ bất kỳ mối nguy nào của sản phẩm và quy trình. Điều này làm cho HSE trở thành một phần không thể thiếu của bất kỳ ngành kỹ thuật nào.
55	CHE2012IU	Chemical Engineering Lab	Thực hành kỹ thuật hóa học	1	TH		Môn học này được thiết kế dành cho sinh viên theo học chương trình kỹ sư hóa học và cung cấp các kỹ năng chuyên nghiệp trong việc áp dụng những kiến thức cơ bản của kỹ thuật hóa học thông qua thực nghiệm.

56	CHE2092IU	Chemical Process Design and Simulation	Thiết kế và mô phỏng quá trình hóa học	3	TH	HT: Động học phản ứng và xúc tác, Kỹ thuật phản ứng, Quá trình và thiết bị truyền khối, Quá trình và thiết bị truyền nhiệt, Các quá trình và thiết bị cơ học	Nghiên cứu về các kỹ thuật mô hình hóa và mô phỏng các quá trình hóa học để có được kỹ năng sử dụng các công cụ mô phỏng các quá trình kỹ thuật hoá học.
57	CHE3111IU	Green Chemical Engineering	Kỹ thuật hóa học xanh	3	LT	HT: Động học phản ứng và xúc tác	Khóa học này sẽ giới thiệu cho sinh viên kỹ thuật hóa học xanh để đưa ra các công nghệ và phương pháp xử lý hóa học mới tạo ra ít hoặc không gây ô nhiễm và cũng thúc đẩy thực hành các lựa chọn kỹ thuật bền vững hơn. Đặc biệt, thiết kế lò phản ứng hóa học để đạt hiệu suất tối đa là chìa khóa để giảm thiểu chất thải. Khóa học sẽ tập trung vào các nguyên tắc của kỹ thuật phản ứng hóa học với một số yếu tố chính ảnh hưởng đến hiệu suất lò phản ứng sẽ được giới thiệu.
58	CHE3211IU	Nanomaterials	Vật liệu nano	3	LT		Khóa học này sẽ thảo luận về tổng hợp, đặc tính tính chất và ứng dụng của vật liệu được cấu trúc trên quy mô nanomet.
59	CHE3221IU	Biomaterials	Vật liệu sinh học	3	LT		Một kỹ sư của chuyên ngành kỹ thuật hóa học nên hiểu vật liệu sinh học, và sửa đổi bề mặt của nó cho các ứng dụng cụ thể. Ngoài ra, một kỹ sư phải hiểu cách chọn vật liệu và cách thiết kế giàn giáo cho khu vực cấy ghép cụ thể.
60	CHE3311U	Organic Chemistry Synthesis	Tổng hợp hữu cơ	3	LT	HT: Hóa hữu cơ 2	Khóa học này cung cấp cho sinh viên trình độ trung cấp của hóa học hữu cơ với sự nhấn mạnh vào tổng hợp hữu cơ. Tổng hợp hữu cơ là quá trình xây dựng các phân tử hữu cơ từ nguyên liệu ban đầu đơn giản hơn thông qua các phản ứng hóa học. Đây là một chủ đề quan trọng vì các phân tử hữu cơ tạo thành kết cấu cơ bản của sự sống.
61	CHE3414IU	Advanced Engineering Drawing	Vẽ kỹ thuật nâng cao	2	LT	HT: Vẽ kỹ thuật	Khóa học trang bị kiến thức nâng cao về sử dụng phần mềm AutoCAD mà kỹ sư môi trường cần phải nắm được. Môn này yêu cầu sinh viên phải có kiến thức vẽ kỹ thuật cơ bản từ môn học “Vẽ kỹ thuật” về hình chiếu và các lệnh AutoCAD.

62	CHE3415IU	Advanced Engineering Drawing Lab	Thực hành Vẽ kỹ thuật nâng cao	1	TH	SH: Vẽ kỹ thuật nâng cao	Khóa học này nhằm cung cấp cho sinh viên khả năng tạo dựng và quản lý các bản vẽ kỹ thuật theo các tiêu chí trong tiêu chuẩn Việt nam và quốc tế, sử dụng phần mềm AutoCAD. Môn học này cung cấp kiến thức nâng cao về sử dụng phần mềm AutoCAD và kỹ năng ứng dụng vào thể hiện các bản vẽ kỹ thuật chuyên ngành.
632	CHE3121IU	Environmental Chemistry 1	Hóa môi trường 1	3	LT	HT: Hóa phân tích 2	Môn học này được thiết kế dành cho sinh viên theo học chương trình kỹ sư môi trường. Sinh viên sẽ thực hành các kỹ thuật cơ bản cho phân tích hóa học các thông số phổ biến để đánh giá chất lượng nước.
64	CHE3131IU	Environmental Chemistry 2	Hóa môi trường 2	3	LT		Trong môn học này, sinh viên sẽ sử dụng những nguyên tắc cơ bản của hóa học để hiểu về nguồn gốc, sự sống còn và tính phản ứng của các hợp chất trong môi trường tự nhiên và ô nhiễm. Sự tập trung sẽ được đặt vào hóa học của khí quyển và đất lưu. Công việc thực hành cơ bản hỗ trợ các chủ đề trong bài giảng.
65	CHE3231IU	Heterogeneous Catalysis	Xúc tác dị thể	3	LT		Khóa học này bắt đầu với những điều cơ bản về xúc tác và đi sâu hơn vào các khía cạnh khác nhau của kỹ thuật chuẩn bị xúc tác và đặc tính. Các khía cạnh của thử nghiệm xúc tác và các loại lò phản ứng sẽ được bao gồm. Các chủ đề cũng sẽ bao gồm nghiên cứu về cơ chế phản ứng và động học của các phản ứng xúc tác không đồng nhất. Ảnh hưởng của các quá trình vận chuyển bên ngoài và bên trong đến tốc độ phản ứng sẽ được đề cập. Các chủ đề sẽ bao gồm Mô hình hóa, ước tính tham số và phân biệt đối xử mô hình. Ngừng hoạt động xúc tác, đó là vấn đề chính phải đối mặt trong quá trình xúc tác không đồng nhất sẽ được đề cập chi tiết. Các quy trình xúc tác công nghiệp thực tế khác nhau sẽ được thảo luận. Những phát triển mới trong xúc tác sẽ được đề cập. Khái niệm về chất xúc tác pin nhiên liệu, chất xúc tác nguyên khối và chất xúc tác nano sẽ được giới thiệu. Các phương pháp thiết kế chất xúc tác mới nhất và các kỹ thuật mô phỏng tương ứng cũng sẽ được đưa vào khóa học. Mỗi chủ đề sẽ được phát triển dần dần và gắn với cập nhật...
66	CHE3324IU	Methods for Natural Products and Drugs	Các phương pháp nghiên cứu cho hợp chất thiên nhiên và thuốc	2	LT		Khóa học này là để giới thiệu các phương pháp và kỹ thuật đặc biệt được sử dụng trong nghiên cứu các sản phẩm tự nhiên và thuốc. Các chủ đề được đề cập bao gồm: các phương pháp điển hình để tách và phân lập các sản phẩm tự nhiên; xác định cấu trúc hợp chất hữu cơ bằng phân tích hiện đại như NMR, MS, IR,...; tổng hợp thuốc và các hợp chất hữu cơ.

67	CHE3325IU	Methods for Natural Products and Drugs lab	Thực hành Các phương pháp nghiên cứu cho hợp chất thiên nhiên và thuốc	1	TH	SH: Các phương pháp nghiên cứu cho hợp chất thiên nhiên và thuốc	Khóa học này là phần phòng thí nghiệm của khóa học Phương pháp cho các sản phẩm tự nhiên và thuốc. Khóa học là để giới thiệu các phương pháp và kỹ thuật đặc biệt được sử dụng trong nghiên cứu các sản phẩm tự nhiên và thuốc. Các chủ đề được đề cập bao gồm: các phương pháp điển hình để tách và phân lập các sản phẩm tự nhiên; xác định cấu trúc hợp chất hữu cơ bằng phân tích hiện đại như NMR, MS, IR,...; tổng hợp thuốc và các hợp chất hữu cơ.
68	CHE3421IU	Piping and Instruments System Design	Thiết kế đường ống và thiết bị	3	3		Khóa học này trang bị cho sinh viên các nguyên tắc và thực hành thiết kế "Sơ đồ đường ống và thiết bị đo đạc - Sơ đồ P & ID" cho các ngành công nghiệp chế biến. Cụ thể hơn, các nội dung chính của khóa học này là: Nguyên tắc và thực tiễn tạo/thiết kế sơ đồ P&ID đáp ứng các yêu cầu về khả năng hoạt động và khả năng kiểm soát của quy trình, cũng như yêu cầu về an toàn quy trình; Kiến thức liên quan đến vẽ/trình bày thiết bị, dụng cụ trên P&ID, cũng như trình bày thông tin kỹ thuật mô tả đặc điểm của thiết bị, dụng cụ trên P&ID; Kiến thức liên quan đến bản vẽ P&ID.
69	CHE3141IU	Sustainable Energy	Năng lượng bền vững	3	LT		Môn học này sẽ giới thiệu cho sinh viên các khái niệm về quá trình chuyển đổi năng lượng bền vững. Một số quá trình chuyển đổi năng lượng chính như năng lượng mặt trời, năng lượng gió, năng lượng thủy điện, năng lượng hydro, sinh khối và năng lượng địa nhiệt cùng với các công nghệ lưu trữ năng lượng sẽ được thảo luận.
70	CHE3151IU	Natural Gas Processing	Chế biến khí thiên nhiên	3	LT		Khóa học này là để cung cấp một cái nhìn tổng quan về các quá trình hóa học thường được thực hiện để xử lý khí tự nhiên chiết xuất từ mặt đất thành một mặt hàng có giá trị. Khóa học này bao gồm các yếu tố cơ bản của phân tích kinh tế, tối ưu hóa và mô tả một vài hoạt động đơn vị cần thiết cho việc thực hiện các nhà máy xử lý khí đốt tự nhiên.
71	CHE3241IU	Bioinorganic Chemistry	Hóa sinh vô cơ	3	LT		Khóa học này sẽ giới thiệu các sinh viên đến với giao thoa giữa hóa học vô cơ và hóa sinh. Đầu tiên là giới thiệu các khái niệm cơ bản của hóa sinh và hóa học vô cơ, sẽ làm cơ sở cho các cuộc thảo luận sâu rộng về hóa học đa dạng của kim loại trong sinh học. Vì hóa học vô cơ sinh học là một lĩnh vực liên ngành cao, khóa học này không thể bao gồm tất cả các khía cạnh của nó. Khóa học này tập trung vào các chủ đề phổ biến được tìm thấy trong lĩnh vực này. Một số hệ thống quan trọng và những tiến bộ gần đây với các ứng dụng tiềm năng sẽ được chú trọng.

72	CHE3331IU	Medicinal Chemistry	Hóa dược	3	LT		Khóa học này sẽ bao gồm các nguyên tắc của hành động thuốc và thiết kế và phát triển các liệu pháp tiềm năng. Hành động và hành vi của các hợp chất dược phẩm và mối quan hệ giữa cấu trúc của chúng và các đặc tính hóa học và trị liệu của chúng, và các cân nhắc hóa học trong thiết kế thuốc cũng sẽ được khám phá. Các phương pháp khám phá thuốc sẽ được giới thiệu bao gồm phát triển thuốc từ các sản phẩm tự nhiên, mô hình hóa máy tính và thiết kế thuốc hợp lý.
73	CHE3431IU	Treatment Plant Operation	Vận hành nhà máy xử lý	3	LT		Khóa học này cung cấp các nguyên tắc cơ bản cho hoạt động hiệu quả, an toàn và hợp pháp của hệ thống xử lý nước thải hoặc vệ sinh. Khóa học này cung cấp các kỹ năng trong thiết lập thí nghiệm được sử dụng cho các đơn vị vận hành của các nhà máy xử lý nước thải. Nó cũng cung cấp những điều cơ bản về luật pháp và quy định môi trường, quản lý rủi ro và HSE.
74	CHE3251IU	Corrosion Chemistry	Hóa học ăn mòn	3	LT		Khóa học này sẽ giới thiệu cho sinh viên các khái niệm về ăn mòn. Cơ chế ăn mòn bao gồm ăn mòn hoạt động, ăn mòn điện, thụ động và ăn mòn cục bộ và các phản ứng khử điện hóa và nứt được hỗ trợ bởi môi trường sẽ được bảo hiểm. Các phương pháp giảm thiểu ăn mòn bao gồm bảo vệ catốt, lớp phủ, chất ức chế và chất thụ động cũng như ảnh hưởng của thành phần hóa học và cấu trúc vi mô của vật liệu đến hành vi ăn mòn cũng sẽ được thảo luận.
75	CHE0042IU	Project 1	Đồ án môn học 1	1	TH		Khóa học giới thiệu kiến thức cơ bản về nghiên cứu khoa học, lập kế hoạch nghiên cứu và phát triển đề án nghiên cứu để chuẩn bị cho luận văn tốt nghiệp
76	CHE0052IU	Project 2	Đồ án môn học 2	1	TH		Khóa học này thuộc về một loạt hai khóa học được cung cấp cho các sinh viên trong năm thứ 3 và học kỳ 1 của năm thứ 4. Khóa học được thiết kế để cho phép các sinh viên được tiếp xúc với một loạt các lĩnh vực nghiên cứu trong Kỹ thuật Hóa học thông qua việc tham gia vào nhóm phòng thí nghiệm. Các sinh viên sẽ học cách đưa ra các giả thuyết, thiết kế các thí nghiệm kiểm tra giả thuyết của họ, ghi lại dữ liệu của họ trong sổ ghi chép trong phòng thí nghiệm, phân tích phê bình kết quả phân tích của họ và trình bày phát hiện của họ cho người khác.
77	CHE0062IU	Project 3	Đồ án môn học 3	1	TH		Khóa học giới thiệu cho sinh viên kiến thức cơ bản về an toàn sức khỏe và môi trường (HSE) trong kỹ thuật, nhấn mạnh vào việc quản lý rủi ro liên quan đến bất kỳ sản phẩm và quy trình nguy hiểm nào trong suốt vòng đời của nó.

78	CHE0041IU	Research Methodology	Phương pháp nghiên cứu khoa học	2	LT		Khóa học giới thiệu kiến thức cơ bản về nghiên cứu khoa học, lập kế hoạch nghiên cứu và phát triển đề án nghiên cứu, thiết kế thí nghiệm, thử nghiệm các giả thuyết, thủ tục đăng bài báo để chuẩn bị cho luận văn tốt nghiệp. Sinh viên được yêu cầu thực hiện một dự án môn học để đánh giá khả năng vận dụng lý thuyết vào thực tiễn cũng như để phát triển các kỹ năng xây dựng mối quan hệ
79	CHE4012IU	Research 1	Nghiên cứu 1	1	TH		Khóa học cung cấp cho sinh viên kiến thức nghiên cứu trong các lĩnh vực của kỹ thuật hóa học, thông qua việc tham gia các nhóm thí nghiệm. Sinh viên sẽ học cách đặt giả thuyết, thiết kế thí nghiệm để thử nghiệm các giả thuyết đó, ghi nhận số liệu từ nhật ký thí nghiệm, phân tích kết quả xử lý số liệu và trình bày kết quả nghiên cứu.
80	CHE4062IU	Internship 1	Thực tập 1	2	TH		Khóa học này tổ chức các chuyến đi thực tế tìm hiểu các mô hình thực trong lĩnh vực kỹ thuật hóa học, giúp sinh viên sẽ hiểu rõ hơn về các vấn đề về kỹ thuật hóa học, có nhận thức và định hướng nghề nghiệp cho quá trình học tập, nghiên cứu ở những năm học tiếp theo và sau khi tốt nghiệp. Thông qua môn học, sinh viên sẽ phát huy được khả năng chủ động trong việc tiếp xúc doanh nghiệp, đi sâu tìm hiểu hoạt động của doanh nghiệp trong lĩnh vực kỹ thuật hóa học.
81	CHE4072IU	Internship 2	Thực tập 2	3	TH	HT: Thực tập 1	Khóa học giúp sinh viên tìm hiểu và áp dụng các nguyên lý về kỹ thuật hóa học trong phòng thí nghiệm, nơi làm việc và/hoặc nhà máy. Trước khi đi thực tập, sinh viên sẽ được giao nhiệm vụ tùy theo từng lĩnh vực đặc thù. Sinh viên sẽ làm việc dưới sự hướng dẫn và chỉ đạo của người hướng dẫn thực tập. Cuối cùng, sinh viên sẽ nộp một báo cáo bằng văn bản và thuyết trình trước hội đồng về những công việc đã làm, và một phiếu báo cáo bao gồm nhận xét và đề xuất từ người hướng dẫn thực tập.
82	CHE4082IU	Internship 3	Thực tập 3	3	TH	HT: Internship 2	Khóa học trang bị cho sinh viên kiến thức thực tiễn trong lĩnh vực kỹ thuật hóa học. Khóa học tạo cơ hội cho sinh viên vận dụng kiến thức đã học trên lớp vào ứng dụng thực tế, tạo điều kiện cho sinh viên có cơ hội làm việc trong môi trường công nghiệp hoặc tham gia nghiên cứu. Thông qua thời gian thực tập, sinh viên sẽ hiểu rõ hơn về nghề nghiệp trong lĩnh vực kỹ thuật hóa học, nâng cao kỹ năng nghề và phát triển mạng lưới chuyên môn.

83	CHE4512IU	Pre-thesis	Đề cương luận văn	2	TH		Môn học này được thiết kế cho sinh viên theo học ngành Kỹ thuật môi trường, nhằm phát triển kỹ năng viết đề xuất (proposal). Sinh viên học cách xác định các vấn đề và phạm vi của các vấn đề kỹ thuật; kết luận về các vấn đề môi trường cần xử lý; xem xét và đề xuất các giải pháp xử lý phù hợp. Đồng thời, sinh viên rèn luyện các kỹ năng tự đọc, đánh giá, viết và bảo vệ đề xuất của mình.
84	CHE4522IU	Thesis	Luận văn	10	TH	HT: Đề cương luận văn	Luận văn tốt nghiệp được thực hiện dưới sự hướng dẫn của một hoặc nhiều giảng viên hướng dẫn. Đề tài của luận văn bao gồm các định hướng thiết kế, nghiên cứu hay ứng dụng thực tế sẽ do giảng viên hoặc sinh viên đề xuất và phải được sự đồng ý của Trưởng Bộ môn. Sinh viên vận dụng kiến thức thu được một cách có hệ thống để giải quyết các vấn đề về môi trường. Giải quyết các vấn đề môi trường bằng cách áp dụng kiến thức có hệ thống.

TRƯỞNG KHOA



Huỳnh Kim Lâm

**KT. HIỆU TRƯỞNG
PHÓ HIỆU TRƯỞNG**

Đinh Đức Anh Vũ

Phụ lục 1

**NỘI DUNG ĐIỀU CHỈNH CHƯƠNG TRÌNH ĐÀO TẠO
NGÀNH KỸ THUẬT HÓA HỌC KHÓA 2023 SO VỚI KHÓA 2022**

*(Kèm theo Quyết định số /QĐ-ĐHQT ngày tháng năm 2023
của Hiệu trưởng Trường Đại học Quốc tế)*

1. Các môn học loại bỏ khỏi chương trình đào tạo

STT	Hủy bỏ môn học				
	Mã môn học	Tên môn học	Số tín chỉ	Nhóm môn	Lý do
1	CHE4042IU	Internship (0,2)	2	Bắt buộc	Điều chỉnh để thêm số TC thực tập theo TT 17
2	EE051IU	Principle of EE1 (3,0)	3	Bắt buộc	Điều chỉnh để thêm số TC thực tập theo TT 17
3	CHE4022IU	Research 2 (0,1)	1	Bắt buộc	Điều chỉnh để thêm số TC thực tập theo TT 17
4	PH014IU	Physics 2 – Thermodynamic (2,0)	2	Bắt buộc	Điều chỉnh để thêm số TC thực tập theo TT 17
5	BT311IU	Biology (3,0)	3	Bắt buộc	Điều chỉnh để thêm số TC thực tập theo TT 17
6	BT312IU	Practice in Biology (0,1)	1	Bắt buộc	Điều chỉnh để thêm số TC thực tập theo TT 17
7	CHE2082IU	Introduction to Health Safety and Environment (0,1)	1	Bắt buộc	Điều chỉnh theo kết quả khảo sát các bên liên quan
8	EE057IU	Programming for engineers (3,0)	3	Bắt buộc	Điều chỉnh để thêm số TC thực tập theo TT 17
9	EE058IU	Programming for engineers Lab (0,1)	1	Bắt buộc	Điều chỉnh để thêm số TC thực tập theo TT 17
10	CHE0031IU	Research Methodology	3	Bắt buộc	Điều chỉnh để thêm số TC thực tập theo TT 17
11	CHE4052IU	Thesis (0,12)	12	Bắt buộc	
	Tổng số tín chỉ giảm xuống		32		

2. Các môn học bổ sung vào chương trình đào tạo

STT	Thêm môn học				
	Mã môn học	Tên môn học	Số TC	Nhóm môn	Lý do
1	CHE4062IU	Internship 1 (0,2)	2	Bắt buộc	Thêm số TC thực tập theo TT 17
2	CHE4072IU	Internship 2 (0,3)	3	Bắt buộc	Thêm số TC thực tập theo TT 17
3	CHE4082IU	Internship 3 (0,3)	3	Bắt buộc	Thêm số TC thực tập theo TT 17
4	CHE4512IU	Pre-thesis (0,2)	2	Bắt buộc	Tách môn Thesis (0,12) thành Pre-thesis (0,2) + Thesis (0,10)
5	CHE2012IU	Chemical Engineering Laboratory (0,1)	1	Bắt buộc	Thêm môn học thực hành chuyên ngành
6	PE021IU	Pháp luật đại cương (3,0)	3	Bắt buộc	Thêm kiến thức Pháp luật Việt Nam theo TT 17, vào Khối kiến thức Khoa học xã hội - Nhân văn - Nghệ thuật
7	CHE2081IU	Occupational Health Safety and Environment (2,0)	2	Bắt buộc	Bổ sung theo kết quả khảo sát các bên liên quan/ tăng cơ hội về nghề nghiệp cho người học/ đảm bảo yêu cầu khi đi thực tập tại một số đơn vị
8	CH012IU	Chemistry Laboratory (0,1)	1	Bắt buộc	Thêm môn học thực hành đại cương để bổ sung kiến thức/kỹ năng cần thiết cho các môn học sau
9	CHE2092IU	Chemical Process Design and Simulation	3	Bắt buộc	Thêm môn chuyên ngành
10	BA154IU	Entrepreneurship and Small Business Management (3,0)	3	Tự chọn	Thêm môn tự chọn vào Khối kiến thức Kinh tế- quản lý. (Không ảnh hưởng tổng số tín chỉ của CTĐT)
11	BA151IU	Introduction to Business Administration (3,0)	3	Tự chọn	Thêm môn tự chọn vào Khối kiến thức Kinh tế- quản lý. (Không ảnh hưởng tổng số tín chỉ của CTĐT)
12	CHE0041IU	Research Methodology	2	Bắt buộc	Điều chỉnh để thêm số TC thực tập theo TT 17
13	CHE0042IU	Project 1 (0,1)	1	Tự chọn	Thêm vào danh sách MH thuộc Khối kiến thức Chuyên ngành tự chọn tự do để linh hoạt khi vận hành CTĐT khóa cũ và khóa mới. Thay đổi này không ảnh hưởng tổng số tín chỉ của CTĐT
14	CHE0052IU	Project 2 (0,1)	1	Tự chọn	
16	CHE0062IU	Project 3 (0,1)	1	Tự chọn	
16	CHE4522IU	Thesis (0,10)	10	Bắt buộc	
	Tổng số tín chỉ tăng thêm		32		

3. Các điều chỉnh khác

3.1 Điều chỉnh nhóm môn học tự chọn

Chuyển Môn học Tự chọn bắt buộc trong 3 nhóm thành Môn học Tự chọn tự do

STT	CTĐT hiện hành					Điều chỉnh				
	Mã môn học	Tên môn học	Số TC	Nhóm môn	Ghi chú	Mã môn học	Tên môn học	Số TC	Nhóm môn	Ghi chú
	Khối kiến thức Chuyên ngành - Tự chọn					Khối kiến thức Chuyên ngành - Tự chọn				
	<i>Sinh viên lựa chọn tối thiểu 3 môn học bất kỳ (9 tín chỉ) trong 3 nhóm môn học</i>					<i>Sinh viên lựa chọn tối thiểu 9 tín chỉ trong danh sách các môn học</i>				
1	CHE3111IU	Kỹ thuật hóa học xanh	3	Tự chọn chuyên ngành	Tự chọn bắt buộc theo nhóm	CHE3111IU	Kỹ thuật hóa học xanh	3	Tự chọn chuyên ngành	Tự chọn Tự do
2	CHE3211IU	Vật liệu nano	3	Tự chọn chuyên ngành	Tự chọn bắt buộc theo nhóm	CHE3211IU	Vật liệu nano	3	Tự chọn chuyên ngành	Tự chọn Tự do
3	CHE3221IU	Vật liệu sinh học	3	Tự chọn chuyên ngành	Tự chọn bắt buộc theo nhóm	CHE3221IU	Vật liệu sinh học	3	Tự chọn chuyên ngành	Tự chọn Tự do
4	CHE3311U	Tổng hợp hữu cơ	3	Tự chọn chuyên ngành	Tự chọn bắt buộc theo nhóm	CHE3311U	Tổng hợp hữu cơ	3	Tự chọn chuyên ngành	Tự chọn Tự do
5	CHE3414IU	Vẽ kỹ thuật nâng cao	2	Tự chọn chuyên ngành	Tự chọn bắt buộc theo nhóm	CHE3414IU	Vẽ kỹ thuật nâng cao	2	Tự chọn chuyên ngành	Tự chọn Tự do
6	CHE3415IU	Thực hành Vẽ kỹ thuật nâng cao	1	Tự chọn chuyên ngành	Tự chọn bắt buộc theo nhóm	CHE3415IU	Thực hành Vẽ kỹ thuật nâng cao	1	Tự chọn chuyên ngành	Tự chọn Tự do
7	CHE3121IU	Hóa môi trường 1	3	Tự chọn chuyên ngành	Tự chọn bắt buộc theo nhóm	CHE3121IU	Hóa môi trường 1	3	Tự chọn chuyên ngành	Tự chọn Tự do
8	CHE3131IU	Hóa môi trường 2	3	Tự chọn chuyên ngành	Tự chọn bắt buộc theo nhóm	CHE3131IU	Hóa môi trường 2	3	Tự chọn chuyên ngành	Tự chọn Tự do
9	CHE3231IU	Xúc tác dị thể	3	Tự chọn chuyên ngành	Tự chọn bắt buộc theo nhóm	CHE3231IU	Xúc tác dị thể	3	Tự chọn chuyên ngành	Tự chọn Tự do

STT	CTĐT hiện hành					Điều chỉnh				Ghi chú
	Mã môn học	Tên môn học	Số TC	Nhóm môn	Ghi chú	Mã môn học	Tên môn học	Số TC	Nhóm môn	
10	CHE3324IU	Các phương pháp nghiên cứu cho hợp chất thiên nhiên và thuốc	2	Tự chọn chuyên ngành	Tự chọn bắt buộc theo nhóm	CHE3324IU	Các phương pháp nghiên cứu cho hợp chất thiên nhiên và thuốc	2	Tự chọn chuyên ngành	Tự chọn Tự do
11	CHE3325IU	Thực hành Các phương pháp nghiên cứu cho hợp chất thiên nhiên và thuốc	1	Tự chọn chuyên ngành	Tự chọn bắt buộc theo nhóm	CHE3325IU	Thực hành Các phương pháp nghiên cứu cho hợp chất thiên nhiên và thuốc	1	Tự chọn chuyên ngành	Tự chọn Tự do
12	CHE3421IU	Thiết kế đường ống và thiết bị	3	Tự chọn chuyên ngành	Tự chọn bắt buộc theo nhóm	CHE3421IU	Thiết kế đường ống và thiết bị	3	Tự chọn chuyên ngành	Tự chọn Tự do
13	CHE3141IU	Năng lượng bền vững	3	Tự chọn chuyên ngành	Tự chọn bắt buộc theo nhóm	CHE3141IU	Năng lượng bền vững	3	Tự chọn chuyên ngành	Tự chọn Tự do
14	CHE3151IU	Chế biến khí thiên nhiên	3	Tự chọn chuyên ngành	Tự chọn bắt buộc theo nhóm	CHE3151IU	Chế biến khí thiên nhiên	3	Tự chọn chuyên ngành	Tự chọn Tự do
15	CHE3241IU	Hóa sinh vô cơ	3	Tự chọn chuyên ngành	Tự chọn bắt buộc theo nhóm	CHE3241IU	Hóa sinh vô cơ	3	Tự chọn chuyên ngành	Tự chọn Tự do
16	CHE3331IU	Hóa dược	3	Tự chọn chuyên ngành	Tự chọn bắt buộc theo nhóm	CHE3331IU	Hóa dược	3	Tự chọn chuyên ngành	Tự chọn Tự do
17	CHE3431IU	Vận hành nhà máy xử lý	3	Tự chọn chuyên ngành	Tự chọn bắt buộc theo nhóm	CHE3431IU	Vận hành nhà máy xử lý	3	Tự chọn chuyên ngành	Tự chọn Tự do
18	CHE3251IU	Hóa học ăn mòn	3	Tự chọn chuyên ngành	Tự chọn bắt buộc theo nhóm	CHE3251IU	Hóa học ăn mòn	3	Tự chọn chuyên ngành	Tự chọn Tự do
						CHE0042IU	Project 1	1	Tự chọn chuyên ngành	Tự chọn Tự do
						CHE0052IU	Project 2	1	Tự chọn chuyên ngành	Tự chọn Tự do
						CHE0062IU	Project 3	1	Tự chọn chuyên ngành	Tự chọn Tự do
Tổng số tín chỉ ảnh hưởng đến tổng số tín chỉ của CTĐT: 0										

3.2 Bổ sung môn học tự chọn (Chỉ thêm môn học, không thay đổi số tín chỉ)

– Bổ sung 02 môn tự chọn vào nhóm Tự chọn Khối kinh tế (chỉ thêm môn học, không làm thay đổi số tín chỉ).

– Bổ sung 03 môn tự chọn vào nhóm môn chuyên ngành tự chọn (Thêm môn học để linh hoạt khi vận hành CTĐT cũ và mới cho các môn có sự tăng/giảm tín chỉ).

CTĐT hiện hành			Điều chỉnh			
Mã MH	Tên MH	Số TC (LT, TH)	Mã MH	Tên MH	Số TC (LT, TH)	Ghi chú
Nhóm tự chọn Khối Kinh tế						
IT120IU	Khởi nghiệp	3(3,0)	IT120IU	Khởi nghiệp	3(3,0)	
ENEE4011IU	Quản lý dự án kỹ thuật	3(3,0)	ENEE4011IU	Quản lý dự án kỹ thuật	3(3,0)	
			BA115IU	Quản trị học	3(3,0)	
			BA154IU	Sáng lập doanh nghiệp	3(3,0)	
Nhóm tự chọn chuyên ngành						
			CHE0042IU	Project 1	1(0,1)	
			CHE0052IU	Project 2	1(0,1)	
			CHE0062IU	Project 3	1(0,1)	
Tổng số tín chỉ ảnh hưởng đến tổng số tín chỉ của CTĐT: 0						

3.3 Xét môn học tương đương

Môn học				Môn học tương đương, thay thế		
STT	Mã MH	Tên MH	TC	Mã MH	Tên MH	TC
1	CHE0031IU	Research Methodology (3,0)	3	CHE0041IU	Research Methodology (2,0)	2
				CHE0042IU	Project 1 (0,1)	1
2	ENEE1001IU	Engineering Drawing (3,0)	3	ENEE1014IU	Engineering Drawing (2,0)	2
				ENEE1015IU	Engineering Drawing Lab (0,1)	1

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

4.1 Đối với các môn đại cương và cơ sở ngành:

STT	Mã MH	Tên môn học	Số TC (LT, TH)	Hướng xử lý
1.	EE051IU	Principles of EE1	4 (3,1)	Vẫn cho sinh viên đăng ký học lại
2.	PH014IU	Physics 2 – Thermodynamic	2 (2,0)	Vẫn cho sinh viên đăng ký học lại
3.	BT311IU	Biology	3 (3,0)	Vẫn cho sinh viên đăng ký học lại
4.	BT312IU	Practice in Biology	(0,1)	Vẫn cho sinh viên đăng ký học lại
5.	EE057IU	Programing for Engineers	3 (3,0)	Vẫn cho sinh viên đăng ký học lại
6.	EE058IU	Programing for Engineers Lab	1 (0,1)	Vẫn cho sinh viên đăng ký học lại

4.2 Đối với các môn học khác:

STT	Mã môn học	Tên môn học	Số TC (LT, TH)	Hướng xử lý
1.	CHE4042IU	Internship	2 (0,2)	Đổi thành CHE4062IU Internship 1, 2(0,2)
2.	CHE0031IU	Research Methodology	3 (3,0)	Đổi thành CHE0041IU Research Methodology (2,0) + CHE0042IU Project 1 (0,1)
3.	CHE4052IU	Thesis	12 (0,12)	Đổi thành CHE4522IU Thesis (0,10) + CHE4512IU Pre-thesis (0,2)
4.	CHE2082IU	Introduction to Health Safety and Environment	1 (0,1)	Đổi thành môn CHE0062IU Project 3 (0,1)
5.	CHE4022IU	Research 2	1 (0,1)	Đổi thành môn CHE0052IU Project 2 (0,1)

Phụ lục 2
ĐỀ CƯƠNG CHI TIẾT CÁC MÔN HỌC
(Kèm theo Quyết định số /QĐ-ĐHQT ngày tháng năm 2023
của Hiệu trưởng trường Đại học Quốc tế)

STT	Mã môn học	Tên môn học (MH)	
		Tiếng Anh	Tiếng Việt
1.	PE015IU	Philosophy of Marxism and Leninism	Triết học Mác-Lênin
2.	PE016IU	Political economics of Marxism and Leninism	Kinh tế chính trị Mác-Lênin
3.	PE017IU	Scientific socialism	Chủ nghĩa xã hội khoa học
4.	PE018IU	History of Vietnamese Communist Party	Lịch sử Đảng Cộng Sản Việt Nam
5.	PE019IU	Ho Chi Minh's Thoughts	Tư tưởng HCM
6.	PE021IU	General Law	Pháp luật đại cương
7.	PE008IU	Critical Thinking	Tư duy phân tích
8.	PE020IU	Engineering Ethics and Professional Skills	Đạo đức và kỹ năng nghề nghiệp
9.	EN007IU	Writing AE1	Tiếng Anh chuyên ngành 1 (kỹ năng viết)
10.	EN008IU	Listening AE1	Tiếng Anh chuyên ngành 1 (kỹ năng nghe)
11.	EN011IU	Writing AE2	Tiếng Anh chuyên ngành 2 (kỹ năng viết)
12.	EN012IU	Speaking AE2	Tiếng Anh chuyên ngành 2 (kỹ năng nói)
13.	MA001IU	Calculus 1	Toán 1
14.	MA003IU	Calculus 2	Toán 2
15.	PH013IU	Physics 1 - Mechanics	Vật lý 1
16.	CH011IU	Chemistry for Engineers	Hóa đại cương
17.	CH012IU	Chemistry Laboratory	Thực hành Hóa đại cương
18.	ENEE1014IU	Engineering Drawing	Vẽ kỹ thuật
19.	ENEE1015IU	Engineering Drawing Lab	Thực hành Vẽ kỹ thuật
20.	ENEE1019IU	Applied Statistics	Thống kê ứng dụng
21.	ENEE1020IU	Applied Statistics Laboratory	Thực hành thống kê ứng dụng
22.	CHE0011IU	Applied Mechanics	Cơ ứng dụng
23.	CE205IU	Fluid Mechanics	Cơ học lưu chất
24.	CE206IU	Fluid Mechanics Lab	Thực hành cơ lưu chất

25.	IT120IU	Entre- preneurship	Khởi nghiệp
26.	ENEE4011IU	Engineering Project Management	Quản lý dự án kỹ thuật
27.	BA115IU	Introduction to Business Administration	Quản trị học
28.	BA1511IU	Entrepreneurship and Small Business Management	Sáng lập doanh nghiệp
29.	CHE1011IU	Introduction to Chemical Engineering	Nhập môn kỹ thuật hóa học
30.	CHE2103IU	Inorganic Chemistry	Hóa vô cơ
31.	CHE2104IU	Inorganic Chemistry Lab	Thực hành Hóa vô cơ
32.	CHE1081IU	Organic Chemistry 1	Hóa hữu cơ 1
33.	CHE1091IU	Organic Chemistry 2	Hóa hữu cơ 2
34.	CHE1092IU	Organic Chemistry Laboratory	Thực hành Hóa hữu cơ
35.	CHE1051IU	Analytical Chemistry 1	Hóa phân tích 1
36.	CHE1061IU	Analytical Chemistry 2	Hóa phân tích 2
37.	CHE1062IU	Analytical Chemistry Laboratory	Thực hành Hóa phân tích
38.	CHE1031IU	Physical Chemistry 1	Hóa lý 1
39.	CHE1043IU	Physical Chemistry 2	Hóa lý 2
40.	CHE1044IU	Physical Chemistry 2 Lab	Thực hành hóa lý 2
41.	CHE1104IU	Biochemistry	Hóa sinh
42.	CHE1105IU	Biochemistry Lab	Thực hành Hóa sinh
43.	CHE1021IU	Process Instrumentation and Control	Đo lường và điều khiển quá trình
44.	CHE1111IU	Industrial Chemistry	Hóa học công nghiệp
45.	CHE2011IU	Reaction Kinetics and Catalysis	Động học phản ứng và xúc tác
46.	CHE2024IU	Computational Chemistry	Hóa tính toán
47.	CHE2025IU	Computational Chemistry lab	Thực hành hóa tính toán
48.	CHE2034IU	Simulation and Optimization	Mô phỏng và tối ưu hóa
49.	CHE2035IU	Simulation and Optimization Lab	Thực hành Mô phỏng và tối ưu hóa
50.	CHE2041IU	Mass Transfer Operations	Quá trình và thiết bị truyền khối
51.	CHE2051IU	Heat Transfer Operations	Quá trình và thiết bị truyền nhiệt
52.	CHE2061IU	Chemical Reaction Engineering	Kỹ thuật phản ứng
53.	CHE2071IU	Mechanical Unit Operations	Các quá trình và thiết bị cơ học

54.	CHE2081IU	Occupational Introduction to Health Safety and Environment	Giới thiệu về an toàn sức khỏe và môi trường
55.	CHE2012IU	Chemical Engineering Lab	Thực hành kỹ thuật hóa học
56.	CHE2092IU	Chemical Process Design and Simulation	Thiết kế và mô phỏng quá trình hóa học
57.	CHE3111IU	Green Chemical Engineering	Kỹ thuật hóa học xanh
58.	CHE3211IU	Nanomaterials	Vật liệu nano
59.	CHE3221IU	Biomaterials	Vật liệu sinh học
60.	CHE3311IU	Organic Chemistry Synthesis	Tổng hợp hữu cơ
61.	CHE3414IU	Advanced Engineering Drawing	Vẽ kỹ thuật nâng cao
62.	CHE3415IU	Advanced Engineering Drawing Lab	Thực hành Vẽ kỹ thuật nâng cao
63.	CHE3121IU	Environmental Chemistry 1	Hóa môi trường 1
64.	CHE3131IU	Environmental Chemistry 2	Hóa môi trường 2
65.	CHE3231IU	Heterogeneous Catalysis	Xúc tác dị thể
66.	CHE3324IU	Methods for Natural Products and Drugs	Các phương pháp nghiên cứu cho hợp chất thiên nhiên và thuốc
67.	CHE3325IU	Methods for Natural Products and Drugs lab	Thực hành Các phương pháp nghiên cứu cho hợp chất thiên nhiên và thuốc
68.	CHE3421IU	Piping and Instruments System Design	Thiết kế đường ống và thiết bị
69.	CHE3141IU	Sustainable Energy	Năng lượng bền vững
70.	CHE3151IU	Natural Gas Processing	Chế biến khí thiên nhiên
71.	CHE3241IU	Bioinorganic Chemistry	Hóa sinh vô cơ
72.	CHE3331IU	Medicinal Chemistry	Hóa dược
73.	CHE3431IU	Treatment Plant Operation	Vận hành nhà máy xử lý
74.	CHE3251IU	Corrosion Chemistry	Hóa học ăn mòn
75.	CHE0042IU	Project 1	Đồ án môn học 1
76.	CHE0052IU	Project 2	Đồ án môn học 2
77.	CHE0062IU	Project 3	Đồ án môn học 3
78.	CHE0041IU	Research Methodology	Phương pháp nghiên cứu khoa học
79.	CHE4012IU	Research 1	Nghiên cứu 1
80.	CHE4062IU	Internship 1	Thực tập 1
81.	CHE4072IU	Internship 2	Thực tập 2
82.	CHE4082IU	Internship 3	Thực tập 3
83.	CHE4512IU	Pre-thesis	Đề cương luận văn
84.	CHE4522IU	Thesis	Luận văn

ĐẠI HỌC QUỐC GIA TP. HỒ CHÍ MINH
KHOA CHÍNH TRỊ - HÀNH CHÍNH

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

ĐỀ CƯƠNG CHI TIẾT MÔN HỌC

Triết học Mác-Lênin
(Philosophy Marx - Lenin)

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/ECTS	3 tín chỉ/ 4.64 ECTS
<i>Số tiết lý thuyết:</i>	<i>30 (trên lớp)</i>
<i>Số tiết thực hành:</i>	<i>15 (trên lớp)</i>
<i>Số tiết tự học:</i>	<i>90 (về nhà)</i>
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 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	2.1	1.1.3	I3
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 LO.2.2 - Hiểu rõ ý thức theo quan điểm của chủ nghĩa duy vật biện chứng 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 LO.2.4 - Hiểu được phép biện chứng và phép biện chứng duy vật	2.1 2.1 2.1 2.1	1.1.3	T4

		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		
		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		
		LO.2.7 - Hiểu rõ được các quy luật cơ bản của cơ bản của phép biện chứng duy vật và rút ra ý nghĩa phương pháp luận từng quy luật	2.1 2.2		T4
		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 hệ 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 được mối quan hệ 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			

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 <i>Từ khóa tri thức</i> 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 dựa trên thực tiễn LO.4.3. 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
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 LO.5.3. Có nhận thức về sự cần thiết học tập, nghiên cứu suốt đời và vận dụng nó trong cuộc sống.	2.1 2.2	3.1	U3

5.2. Kỹ năng

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.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 (15 tiết)	Chương 1 TRIẾT HỌC VÀ VAI TRÒ CỦA TRIẾT HỌC TRONG ĐỜI SỐNG XÃ HỘI	LO.1; 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 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.	Thi giữa kỳ (Quiz)
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	Thi giữa kỳ (Quiz) Thi cuối kỳ (FEX)

			Chân lý Học ở Lớp: Thảo luận và phát biểu trên lớp Học ngoài lớp: Đọc trước tài liệu chương 3	
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 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 bản 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	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.2 LO.3 LO.4 LO.5
2	Quiz	Bài thi giữa kỳ	Thi theo đề thi chung	20%	Tự luận đề mở	LO.1 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;
f			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 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 & 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.

TP. Hồ Chí Minh, ngày 07 tháng 02 năm 2020

ĐỀ CƯƠNG CHI TIẾT MÔN HỌC

Kinh tế chính trị Mác-Lênin

(Marxist-Leninist Political Economy)

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 tính khối kiến thức:	Cơ sở
Số tín chỉ/ECTS	2 tín chỉ/3.09 ECTS
	<i>Số tiết lí thuyết: 20 (trên lớp)</i>
	<i>Số tiết thực hành: 10 (trên lớp)</i>
	<i>Số tiết tự học: 60 (về nhà)</i>
Môn học song hành:	1. 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. 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. Bảo đảm tính cơ bản, hệ thống, khoa học, cập nhật tri thức mới, gần với thực tiễn. tính sáng tạo, kỹ năng, tư duy, sản phẩm chất người học, tính liên thông khắc phục trùng lặp, tăng cường tích hợp và giảm tái sinh, lược bớt những nội dung không còn phù hợp hoặc những nội dung mang tính kinh viện đối kháng sinh viên các trường Cao đẳng, Đại học không chuyên 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 có lợi cho kinh tế trong phát triển kinh tế - xã hội của đất nước góp phần giúp sinh viên xây dựng trách nhiệm xã hội phù hợp với vị trí công việc và cuộc sống sau khi ra trường.
- 2.3. Ba là, góp phần xây dựng trường, thức hệ tư tưởng Mác – Lê nin đối với sinh viên.

3. Mô tả môn học (Đề cương khóa 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 – Lê nin theo mục tiêu của môn học. Cụ thể các vấn đề như: Hàng hóa, thị trường và vai trò của các chủ sở hữu nền kinh tế thị trường; Sản xuất giá trị thặng dư trong nền kinh tế thị trường; trong 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 có lợi cho kinh tế ở Việt Nam; Công nghiệp hóa, hiện đại hóa và hội nhập kinh tế quốc tế tại Việt Nam.

4. 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 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. Ănggen: Toàn tập, tập 20, tập 23, tập 25, Nxb Chính trị quốc gia, 1994.
 - + V.I.Lê nin toàn tập, tập 3, tập 27. NXB Tiến bộ Maxcova, 1976.
 - + Davig Begg, Stanley Fisher, Rudiger Dornbusch, Kinh tế học, Nhà xuất dục Hà Nội 1992.
 - + Đảng Cộng sản Việt Nam (2016), Văn 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 vấn 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 thể chế kinh tế thị trường định hướng xã hội chủ nghĩa”
 - + Chỉ thị số 16/CT-TTg (2017) “Về việc tăng cường năng lực cạnh kể 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): Caahcs mạng công nghiệp lần thứ 4, Nxb Chính trị quốc gia.
 - + Sự thật, 2018.

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

Chuẩn đầu ra	Mô tả	Tiêu chí đánh giá	Mục tiêu môn học	Chuẩn đầu ra CDIP CTDT	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	LO.1.1-Nắm được sự hình thành và phát triển của Kin tế chính trị Mác-Lênin.	2.1		I3
		LO.1.2- Xác định được đối tượng nghiên của kinh tế chính trị Mác-Lênin.			

Chuẩn đầu ra	Mô tả	Tiêu chí đánh giá	Mục tiêu môn học	Chuẩn đầu ra CDIP CTDT	Mức độ giảng dạy (I/T/U)
	MÁC-LÊNIN	LO.1.3- Hiểu rõ được phương pháp nghiên cứu của kinh tế 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. 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 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.	2.1		T4
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. 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. 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 2.1 2.1 2.3		T4

Chuẩn đầu ra	Mô tả	Tiêu chí đánh giá	Mục tiêu môn học	Chuẩn đầu ra CDIP CTDĐT	Mức độ giảng dạy (I/T/U)
		LO.3.4-Hiểu rõ được bản chất của tích lũy tư bản, nhưng nhân tố làm tăng quy mô quy mô tích lũy tư bản và hệ quả của tích lũy tư bản.	2.3		
		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.	2.1		
		LO.3.6-Hiểu rõ được lợi tức là gì	2.1		
		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.	2.1 2.3		
LO.4	CẠNH TRANH VÀI ĐỘC QUYỀN TRONG NỀN KINH TẾ THỊ TRƯỜNG	LO.4.1- Hiểu rõ được quan hệ 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 được khái niệm kinh tế thị trường định hướng xã hội chủ nghĩa.	2.1		
		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	2.1		

Chuẩn đầu ra	Mô tả	Tiêu chí đánh giá	Mục tiêu môn học	Chuẩn đầu ra CDIP CTDĐT	Mức độ giảng dạy (I/T/U)
		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 là gì và sự cần thiết phải hoàn thiện nó.	2.2		
		LO.5.6 – Hiểu rõ được khái niệm lợi ích kinh tế và quan hệ lợi ích kinh tế.	2.1		
		LO.5.7 - Hiểu rõ được khái niệm lợi ích kinh tế và quan hệ lợi ích kinh tế			
LO.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 gì, khái quát được các cuộc cách mạng đã diễn ra trong lịch sử.	2.1		
		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 Hoa là gì và các mô hình công hóa ở Việt Nam	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 tế quốc tế.	2.3		

Chuẩn đầu ra	Mô tả	Tiêu chí đánh giá	Mục tiêu môn học	Chuẩn đầu ra CDIP CTDT	Mức độ giảng dạy (I/T/U)
		LO.6.9 – Nắm được phương hướng nâng cao hiệu quả hội nhập kinh tế quốc tế trong phát triển của Việt Nam			
5.2. Kỹ năng					
LO.7	THỂ HIỆN KHẢ NĂNG KHÁI QUÁT HÓA, TƯ DUY, TRANH LUẬN, PHẢN BIỆN, LÀM VIỆC NHÓM	LO7.1. Có kỹ năng khái quát hóa để rút ra Từ khóa tri thức đối với mỗi nội dung và tư duy có hệ thống LO7.2. 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 LO7.3. 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 2.4		U4
5.3. Thái độ					
LO.8	THỂ HIỆN Ý THỨC NHẬN THỨC TRONG VÀ SAU KHI HỌC TẬP	L.0.8.1. Có ý thức trách nhiệm bảo Vệ tính khoa học, cách mạng, nhân - văn của CN Mác Lênin L.O.8.2. Có ý thức, trách nhiệm các nhân đối với tập thể, cộng đồng L.0.8.3. Có nhận thức về sự cần thiết học tập, nghiên cứu suốt đời và vận dụng nó trong cuộc sống.	2.1 2.2 2.3		U3

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.1, LO.7;	Day: - Tự giới thiệu về giảng viên. - Giới thiệu đề cương và tài liệu môn học. - Hướng dẫn cách thức dạy và học vũ cách đánh giá. - Giới thiệu nội dung đề tài thuyết trình thiệu về môn học nhóm GIIW . Học ở lớp: - Chia nhóm (5 SV/nham) - Giới thiệu nhóm học tập Học ngoài lớp:	

TT (tiết)	Nội dung giảng dạy	LO	Hoạt động dạy và học	Đánh giá
			-Chọn đề tài thuyết trình của nhóm (GHW) - Đọc trước tài liệu chương 1.	
2 (2 tiết)	Chương 1 ĐỐI TƯỢNG, PHƯƠNG PHÁP NGHIÊN CỨU VÀ CHỨC NĂNG CỦA KINH TẾ CHÍNH TRỊ MÁC - LÊNIN	LO.1; LO.7 LO.8	Dạy: 1. SỰ HÌNH THÀNH VÀ PHÁT TRIỂN CỦA KÍCH MẠC – LÊNIN 1. 1. Giai đoạn từ cổ đại đến 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 MAC-LENIN. 1. Đối tượng nghiên cứu 2. Phương pháp nghiên cứu 3, Mục đích nghiên cứu III. CHỨC NĂNG CỦA TRI MAC-LENIN. 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 VÀ VAI TRÒ CỦA CÁC		Dạy: I. LÝ LUẬN CỦA CÁC MẮC VỀ SẢN XUẤT HÀNG HOA VÀ HÀNG HÓA 1. Sản xuất hàng hội: - Khái niệm sản xuất hàng - Điều kiện ra đời của sản 2. 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	Thi giữa kỳ (Quiz) Thi cuối kỳ (FEX)

TT (tiết)	Nội dung giảng dạy	LO	Hoạt động dạy và học	Đánh giá
	CHỦ THỂ THAM GIA THỊ TRƯỜNG	LO.2 LO.7 LO.8	- Tinh lại mặt của lao động sản xuất hàng hòa. 3. Tiền - Nguồn gốc và bản chất của tiền - Chức năng của tiền 4. Dịch vụ và một số hàng hóa đặc biệt. II. THỊ TRƯỜNG VÀ VAI TRÒ CỦA HÀNG HÓA, THỊ RUỒNG VÀ VAI TRÒ 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	
4 (6 tiết)	Chương 3 GIÁ TRỊ THẶNG DƯ TRONG NỀN KINH TẾ THỊ TRƯỜNG	LO.3 LO.7 LO.8	Day: I. LÝ LUẬN CỦA CÁC MẮC 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 tư bản - Những nhân tố góp phần làm tăng quy mô tích lũy dụng nó trong cuộc sống. - 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	Thi giữa kỳ (Quiz) Thi cuối kỳ (FEX)

TT (tiết)	Nội dung giảng dạy	LO	Hoạt động dạy và học	Đánh giá
			Học ở lớp: Thảo luận và phát triển ở lớp Học ngoại lớp: Hoàn thiện bài thuyết trình Đọc trước tài liệu chương 4	
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 NỀN KINH TẾ THỊ TRƯỜNG. II. ĐỘC QUYỀN VÀ ĐỘC QUYỀN NHÀ NƯỚC TRONG NỀN KINH TẾ THỊ 1. Lý luận của V.I.Lênin về độc quyền trong nền kinh tế thị trường. - Nguyên nhân hình thành và tốc độ của độc quyền trong chủ nghĩa tư bản. - Những đặc điểm kinh tế cơ bản của độc quyền trong chủ nghĩa tư bản 2. Lý luận của VII. 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 Học ngoài lớp: Đọc trước tài liệu chương 5	Thuyết trình nhóm (GHW) Thi cuối kỳ (FEX)
			Dạy: I. KINH TẾ THỊ TRƯỜNG ĐỊNH HƯỚNG XÃ HỘI CHỦ NGHĨA Ở VIỆT NAM	Thuyết trình nhóm (GHW) Thi cuối kỳ (FEX)

TT (tiết)	Nội dung giảng dạy	LO	Hoạt động dạy và học	Đánh giá
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	1. Khái niệm kinh tế thị trường định hướng xã hội chủ nghĩa ở Việt Nam. 2. Tính tất yếu khách quan của việc phát triển kinh tế thị trường định hướng xã hội chủ nghĩa ở Việt Nam. 3. Đặc trưng của kinh tế thị trường định hướng xã hội chủ nghĩa ở Việt Nam. 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 Việt Nam. te 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. 1. Lợi ích kinh tế và quan hệ lợi ích kinh tế. 2. 2 Vai trò của nhà nước trong đảm bảo hài hòa các quan hệ lợi ích Học ở lớp: Thảo luận và phát biểu trên Học ngoài lớp Hoàn thiện bài thuyết trình Đọc trước tài liệu chương 6	
7 (5 tiết)	Chương 6 CÔNG NGHIỆP HÓA, HIỆN ĐẠI HÓA VÀ HỘI NHẬP	LO.6	Dạy: I. CÔNG NGHIỆP HÓA, HIỆN ĐẠI HÓA Ở VIỆT NAM. 1. Khái quát cách mạng công nghiệp và công nghiệp hóa - Khái quát về cách mạng công nghiệp - Công nghiệp hóa và các mô hình công nghiệp hóa trên thế giới	Thuyết trình nhóm (GHW) Thi cuối kỳ (FEX)

TT (tiết)	Nội dung giảng dạy	LO	Hoạt động dạy và học	Đánh giá
	KINH TẾ QUỐC TẾ CỦA VIỆT NAM	LO.7 LO.8	2. Tính tất yếu khách quan và nội dung của công nghiệp hóa, hiện đại hóa ở Việt Nam. - Tính tất yếu của công nghiệp hóa, hiện đại hóa ở Việt Nam. - Nội dung công nghiệp hóa, hiện đại hóa ở Việt Nam. 3. Công nghiệp hóa, hiện đại hóa của Việt Nam trong bối cảnh cách mạng ông nghiệp lần thứ 4. II.HỘI NHẬP KINH TẾ QUỐC TẾ CỦA VIỆT NAM. 1. Khái niệm và các hình thức hội nhập kinh tế quốc tế. - Khái niệm và sự cần thiết khách quan của hội nhập kinh tế quốc tế. - Những nội dung của hội nhập kinh tế quốc tế. 2. Tác động của hội nhập kinh tế quốc tế đến phát triển của Việt Nam. - Tác động tích cực. - Tác động tiêu cực. 3. Phương hướng nâng cao hiệu quả hội nhập kinh tế quốc tế trong phát triển của 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 về đề tài phân công	Thuyết trình nhóm về đề tài đã phân công.	15%	Thuyết trình và bản báo cáo nhóm.	LO.4 LO.5 LO.6 LO.7 LO.8
2	Quiz	Bài thi giữa kì	Thi theo đề thi chung.	20%	Tự luận đề mở.	LO.2 LO.3
3	DIC	Thảo luận, chuyên cần	Điểm thảo luận được tính theo phương pháp	15%	Phát biểu/đặt câu hỏi trên lớp hoặc	LO.7 LO.8

STT	Mã	Tên	Mô tả	Tỷ trọng	Hình thức	LO
		tại lớp (Discussion in Class)	trương đối. SV có số lần thảo luận nhiều nhất tại lớp sẽ được điểm tối đa, điểm của các bạn khác được tính dựa theo bạn có số lần thảo luận cao nhất.		phiếu trả lời trong các nghiên cứu tình huống tại lớp.	
4	FEX	Thi cuối kì	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
			100%	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 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	Thi giữ 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 thể 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 tang quy mô tích lũy. Các khái niệm về	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

TT	Chuẩn đầu ra	Nội dung	Phương pháp	Tiêu chí đánh giá
	chi phí sản xuất, lợi nhuận, lợi tức và địa tô tư bản chủ nghĩa			
LO.4 LO.7	Hiểu rõ và nắm được những nội dung: quan hệ giữ 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 tuyệt 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 tuyệt 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 tuyệt 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 cập nhật 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 theo nhóm qua mail cho GV

- Quy định về giờ ngủ, chuyên cần, kỷ luật trong khóa học: Lên lớp đúng giờ, dự kiến thiếu 80% thời gian học trên lớp (chỉ được phép bỏ qua mặt tối đa 20% số liệu học). Nếu bỏ qua số lượng quy định quy định sẽ bị cấm thi theo quy định. Có đầy đủ điểm kiểm tra, điểm thi kết thúc học phần & nhiệt thảo luận, phát biểu xây dựng bài, nghiêm trọng trong giờ học.

TP. Hồ Chí Minh, ngày 07 tháng 02 năm 2020

ĐỀ CƯƠNG CHI TIẾT MÔN HỌC

Chủ nghĩa xã hội khoa học (Scientific socialism)

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/ECTS:	2 tín chỉ/3.09 ECTS
<i>Số tiết lý thuyết:</i>	<i>30 (trên lớp)</i>
<i>Số tiết thực hành:</i>	
<i>Số tiết tự học:</i>	<i>60 (về nhà)</i>
Môn học trước:	1. 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 nghĩa Mác-Lenin*, 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 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 nghiên cứu Chủ nghĩa xã hội khoa học	2.1	1.1.3	13
LO.2	SỨ MỆNH LỊCH SỬ CỦA GIAI CẤP CÔNG NHÂN	LO.2.1- Hiểu rõ khái niệm giai cấp công nhân và đặc điểm của giai cấp công nhân LO.2.2 – Nắm rõ nội dung, đặc điểm sứ mệnh lịch sử của giai cấp công nhân LO.2.3 – Giải thích được những điều kiện quy định sứ mệnh lịch sử của giai cấp công nhân 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 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 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	2.1 2.1 2.1 2.1 2.1 2.2 2.1 2.2	1.1.3	T4
LO.3		LO.3.1 – Hiểu rõ Chủ nghĩa xã hội là giai đoạn đầu của hình thái kinh tế - xã hội công sản chủ nghĩa LO.3.2 – Trình bày được những đặc trưng cơ bản của chủ nghĩa xã hội	2.1	1.1.3	I3

	CHỦ NGHĨA XÃ HỘI VÀ THỜI KỲ QUÁ ĐỘ LÊN 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 LO.4.2 – Nắm rõ quá trình ra đời và bản chất của nền dân chủ xã hội chủ nghĩa 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 LO.4.4 - hiểu được sự ra đời phát triển và bản chất của nền dân chủ xã hội chủ nghĩa ở Việt Nam 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	2.1 2.1 2.1 2.1 2.1 2.2	1.1.3	T4
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	LO.5.1 – Trình bày được khái 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 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	2.1	1.1.3	I3
		LO.6.1 – Hiểu rõ khái niệm, đặc trưng cơ bản của dân tộc và quan điểm của chủ nghĩa Mác – Lenin về vấn đề dân tộc LO.6.2 – Trình bày được những đặc điểm cơ bản của dân tộc ở	2.1 2.1		

LO.6	VẤN ĐỀ DÂN TỘC VÀ TÔN GIÁO TRONG THỜI KỲ QUÁ ĐỘ LÊN CHỦ NGHĨA XÃ HỘI	Việt Nam và quan điểm chính sách dân tộc của Đảng và Nhà nước Việt Nam	2.1	1.1.3	T4
		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			
		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			
		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 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	2.1	1.1.3	I3
		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			
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 tri thức đối với mỗi nội dung và tư duy có hệ thống	2.1 2.2	2.1.1 2.3.1	U4
		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		2.4.4	
		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		2.5 3.1.5	
	THỂ HIỆN Ý	LO.9.1 – Có ý thức trách nhiệm bảo vệ tính khoa học, cách mạng trong lý luận của chủ nghĩa Mác –			

LO.9	THỨC NHẬN THỨC TRONG VÀ SAU KHI HỌC TẬP	Leenin về CNXH và con đường đi lên CNXH ở Việt Nam	2.1	3.1	U3
		LO.9.2 – Có ý thức, trách nhiệm cá nhân đối với tập thể, cộng đồng	2.2		
		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 lenin 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 Ý nghĩa của việc nghiên cứu chủ nghĩa xã hội khoa học	Thi giữa kì (Quiz)

			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 CẤP 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 GIAI 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 CỦA 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)
4	Chương 3 CHỦ NGHĨA XÃ HỘI VÀ THỜI KỲ QUÁ ĐỘ LÊN CHỦ NGHĨA XÃ HỘI	LO.3 LO.4 LO.5	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 đời chủ nghĩa xã hội 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	Thuyết trình nhóm (GHW) Thi giữa

			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	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	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	Thuyết trình nhóm (GHW) Thi cuối kỳ (FEX)

	KỶ QUÁ ĐỘ LÊN CHỦ NGHĨA XÃ HỘI		LỚP TRONG THỜI KỶ QUÁ ĐỘ LÊN CHỦ NGHĨA XÃ HỘI 3.CƠ CẤU XÃ HỘI - GIAI CẤP VÀ LIÊN MINH GIAI CẤP, TẦNG LỚP TRONG THỜI KỶ 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	
7	Chương 6 VẤN ĐỀ DÂN TỘC VÀ TÔN GIÁO TRONG THỜI KỶ QUÁ ĐỘ LÊN CHỦ NGHĨA XÃ HỘI	LO.2 LO.4 LO.5	Dạy: 1.DÂN TỘC TRONG THỜI KỶ 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 KỶ 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 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	Thuyết trình nhóm (GHW) Thi cuối kỳ (FEX)
			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	

8	Chương 7 VẤN ĐỀ GIA ĐÌNH TRONG THỜI KỲ QUÁ ĐỘ LÊN CHỦ NGHĨA 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

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	15%	Thuyết trình và bản báo cáo nhóm	LO.3 LO.4 LO.5 LO.6 LO.7
2	Quiz	Bài thi giữa kì	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 dựa theo bạn	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
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 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	Chương 6	Thảo luận tại lớp (Discussion in Class), Thi cuối kỳ (FEX)	Tiêu chí đánh giá thuyết trình nhóm, thảo luận tại lớp
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	Chương 7	Thảo luận tại lớp (Discussion in Class) Thi cuối kỳ (FEX)	Tiêu chí đánh giá thuyết trình nhóm, thảo luận tại lớp

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.

TP. Hồ Chí Minh, ngày 07 tháng 02 năm 2019

KT. TRƯỞNG KHOA PHÓ TRƯỞNG KHOA


TS. Nguyễn Đình Quốc Cường



ĐỀ CƯƠNG CHI TIẾT MÔN HỌC

Lịch sử Đảng Cộng sản Việt Nam (History of Vietnamese communist party)

1. Thông tin chung:

Tên môn học (tiếng Việt):	Lịch sử Đảng Cộng sản Việt Nam
Tên môn học (tiếng Anh):	History of Vietnamese communist party
Mã số môn học:	PE018IU
Thuộc khối kiến thức:	CƠ SỞ
Số tín chỉ/ ECTS	2 tín chỉ/ 3.09 ECTS
<i>Số tiết lý thuyết:</i>	<i>20 (trên lớp)</i>
<i>Số tiết thực hành:</i>	<i>10 (trên lớp)</i>
<i>Số tiết tự học:</i>	<i>90 (về nhà)</i>
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 đối với 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.

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)
5.7. <i>Kiến thức</i>					
LO.1	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. 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 LÃNH ĐẠO ĐẦU TRANH GIÀNH CHÍNH QUYỀN (1930-1945)	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
		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			
LO.4	ĐẢNG LÃNH ĐẠO CẢ NƯỚC QUÁ ĐỘ LÊN CHỦ NGHĨA XÃ HỘI VÀ TIẾN HÀNH CÔNG CUỘC ĐỔI MỚI (1975-2018)	LO.4.1 - Hiểu rõ chủ trương xây dựng chủ nghĩa xã hội và bảo vệ Tổ quốc 1975-1981	2.1	1.1.3	T4
		LO.4.2 - Nắm rõ nội dung Đại hội đại biểu toàn quốc lần thứ V của Đảng và các bước đột phá tiếp tục đổi mới kinh tế 1982-1986			
		LO.4.3 – Nắm rõ quan điểm Đổi mới toàn diện, đưa đất nước ra khỏi khủng hoảng kinh tế - xã hội 1986-1996 của Đảng	2.2		
		LO.4.4 - Nắm rõ thành tựu, kinh nghiệm của công cuộc đổi mới			
		LO.4.5 - Hiểu rõ những thắng lợi vĩ đại của cách mạng Việt Nam dưới sự lãnh đạo của Đảng từ năm	2.1		
		LO.4.6 - Hiểu rõ những bài học lớn về sự lãnh đạo của Đảng từ năm 1930 đến 2018	2.2		

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 và Nhà nước. LO.5.3 Có kỹ năng viết, kỹ năng làm việc cá nhân, làm việc nhóm và trình bày kết quả nghiên cứu.	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 môn tốt; hình thành tình cảm, niềm tin vào con đường cách mạng mà dân tộc ta đã lựa	2.1 2.2 2.3	3.1	U3

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.1, 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 nhóm (GHW)	
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.1;	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 cứu 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 Học ngoài lớp: - Phác thảo nội dung thuyết trình nhóm GHW - Đọc trước tài liệu chương 1.	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 4. Tính chất, ý nghĩa và kinh nghiệm của Cách mạng Tháng Tám năm 1945 Học ở lớp: Thảo luận và phát biểu trên lớp Học ngoài lớp: Đọc trước tài liệu chương 2	Thi giữa kỳ (Quiz) Thi cuối kỳ (FEX)

4	Chương 2 ĐẢNG LÃNH ĐẠO HAI CUỘC KHÁNG CHIẾN, HOÀN THÀNH GIẢI PHÓNG DÂN TỘC, THỐNG NHẤT ĐẤT NƯỚC (1945-1975)	LO.3 LO.5	Dạy: I. ĐẢNG LÃNH ĐẠO XÂY DỰNG, BẢO VỆ CHÍNH QUYỀN CÁCH MẠNG VÀ KHÁNG CHIẾN CHỐNG THỰC DÂN PHÁP XÂM LƯỢC (1945-1954) 1. Xây dựng và bảo vệ chính quyền cách mạng 1945-1946 2. Đường lối kháng chiến toàn quốc chống thực dân Pháp xâm lược và quá trình tổ chức thực hiện từ năm 1946-1950 3. Đẩy mạnh cuộc kháng chiến chống thực dân Pháp xâm lược và quá trình tổ chức thực hiện từ năm 1946 đến năm 1950 4. Ý nghĩa lịch sử và kinh nghiệm của Đảng trong lãnh đạo kháng chiến chống thực dân Pháp và can thiệp Mỹ	Thuyết trình nhóm (GHW) Thi cuối kỳ (FEX)	

			Dạy: Chấm thuyết trình & phân biện Học ở lớp: Các nhóm thuyết trình tại lớp II. LÃNH ĐẠO XÂY DỰNG CHỦ NGHĨA XÃ HỘI Ở MIỀN BẮC VÀ KHÁNG CHIẾN CHỐNG ĐẾ QUỐC MỸ XÂM LƯỢC GIẢI PHÓNG MIỀN NAM, THỐNG NHẤT ĐẤT NƯỚC (1954-1975) 1. Lãnh đạo cách mạng hai miền giai đoạn 1954-1965 2. Lãnh đạo cách mạng cả nước giai đoạn 1965-1975 3. Ý nghĩa và kinh nghiệm lãnh đạo của Đảng trong cuộc kháng chiến chống Mỹ, cứu nước 1954-1975 Học ngoài lớp: Đọc trước tài liệu chương 2		
5	Chương 3 ĐẢNG LÃNH ĐẠO CẢ NƯỚC QUÁ ĐỘ LÊN CHỦ NGHĨA XÃ HỘI VÀ TIỀN HÀNH CÔNG CUỘC ĐỔI MỚI (1975-2018)	LO.4 LO.5	Dạy I.ĐẢNG LÃNH ĐẠO CẢ NƯỚC XÂY DỰNG CHỦ NGHĨA XÃ HỘI VÀ BẢO VỆ TÔ QUỐC (1975-1986) 1.Xây dựng chủ nghĩa xã hội và bảo vệ Tổ quốc 1975-1981 2.Đại hội đại biểu toàn quốc lần thứ V của Đảng và các bước đột phá tiếp tục đổi mới kinh tế 1982-1986 Dạy: Chấm thuyết trình & phân biện Học ở lớp: Thảo luận tại lớp II.LÃNH ĐẠO CÔNG CUỘC ĐỔI MỚI, ĐẨY MẠNH CÔNG NGHIỆP HÓA, HIỆN ĐẠI HÓA VÀ HỘI NHẬP QUỐC TẾ (1986-2018) 1. Đổi mới toàn diện, đưa đất nước ra khỏi khủng hoảng kinh tế - xã hội 1986-1996 2. Tiếp tục công cuộc đổi mới, đẩy mạnh công nghiệp hóa, hiện đại hóa và hội nhập quốc tế 1996-2018 3. Thành tựu, kinh nghiệm của công cuộc đổi mới TỔNG LUẬN 1.Những thắng lợi vĩ đại của cách mạng Việt Nam 2.Những bài học lớn về sự lãnh đạo của Đảng	Thuyết trình nhóm (GHW) Thi cuối kỳ (FEX)	

			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	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.1 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.1	- 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 đánh 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.

ĐỀ CƯƠNG CHI TIẾT MÔN HỌC

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

1. Thông tin chung	
Tên môn học (tiếng Việt):	Tư tưởng Hồ Chí Minh
Tên môn học (tiếng Anh):	Ho Chi Minh's Thoughts
Mã số môn học:	PE019IU
Thuộc khối kiến thức:	Cơ sở
Số tín chỉ/ECTS	2 tín chỉ/ 3.09 ECTS
<i>Số tiết lý thuyết:</i>	<i>20 (trên lớp)</i>
<i>Số tiết thực hành:</i>	<i>10 (trên lớp)</i>
<i>Số tiết tự học:</i>	<i>90 (về nhà)</i>
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 về khái niệm, nguồn gốc, quá 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 chủ 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), *Giáo trình Tư tưởng Hồ Chí Minh*, Nxb. Chính 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 - Hiểu được khái niệm tư tưởng Hồ Chí Minh LO.1.2 - Hiểu rõ được đối tượng nghiên cứu LO.1.3 - Hiểu được một số yêu cầu cơ bản về phương pháp học tập, nghiên cứu môn học tư tưởng Hồ Chí Minh LO.1.4 - Hiểu 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 - Hiểu 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	2.1		13

		LO.3.2 - Nắm được quan điểm của Hồ Chí Minh về tính tất yếu đi lên chủ nghĩa xã hội, xây dựng chủ nghĩa xã hội và thời kỳ quá độ lên chủ nghĩa xã hội ở Việt Nam. 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.			
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 ĐẠI ĐOÀN KẾT QUỐC TẾ	LO.5.1 - Hiểu 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 Chí 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.	2.2	2.1.1 2.3.1	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	2.4.4	
		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	2.5 3.1.5	
5.3. Thái Độ					
LO.7	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.	2.3	3.1	U3
		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	2.3		
		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		

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 kỳ (Quiz) Thi cuối kỳ (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: I. 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: Châm 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	Thuyết trình nhóm (GHW) Thi cuối kỳ (FEX)

			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	
5	Chương 4 TƯ TƯỞNG HỒ CHÍ MINH VỀ ĐẢNG CỘNG SẢN VIỆT 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	Thảo luận nhóm (DIC) Thi cuối kỳ (FEX)

			1. Xây dựng Đảng thật sự trong sạch, vững mạnh 2. Xây dựng Nhà nước Học ngoài lớp: Hoàn thiện bài thuyết trình	
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 đức 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 phiếu 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 được 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 ngoại.	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.

TP. Hồ Chí Minh, ngày 07 tháng 02 năm 2022



VIETNAM NATIONAL UNIVERSITY HCMC INTERNATIONAL UNIVERSITY

COURSE SYLLABUS

General Law

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 ¹ : 90 hours
Credit points	3
Required and recommended prerequisites for joining the course	N/A

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.

Course objectives	The overarching aims of this course are to: • 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.	
Course learning outcomes	Upon the successful completion of this course, students will be able to:	
	Competency level	Course learning outcome (CLO)
	Knowledge	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.
	Skill	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 .
	Attitude	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 .
Content	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.	
Examination forms	Multiple choice questions Case-based exams Essay exams Oral exams	

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: <table border="1"> <tr> <td>Assignment</td><td>20%</td></tr> <tr> <td>Midterm examination</td><td>30%</td></tr> <tr> <td>Final examination</td><td>50%</td></tr> <tr> <td>Total</td><td>100%</td></tr> </table> 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 <i>six</i> 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	Assignment	20%	Midterm examination	30%	Final examination	50%	Total	100%
Assignment	20%								
Midterm examination	30%								
Final examination	50%								
Total	100%								

	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 <i>before</i> attendance in classes. Required Course Texts and Materials <u>Legal Texts:</u> 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 <u>Books:</u> • PGS.TS. Phan Trung Hien, <i>Giáo trình Pháp Luật Đại cương</i>, NXB Chính Trị Quốc Gia Sự Thật 2022. • Mai Hong Quy (Chief Editor) (2nd 2017), <i>Introduction to Vietnamese Law</i>, Hong Duc Publishing House. <u>Additional materials provided in Blackboard</u> 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 <u>Recommended Internet sites</u> 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)

	<u>Other Resources, Support and Information</u> 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. <u>Books:</u> • Nguyen Phu Trong, <i>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</i>, NXB Chính Trị Quốc Gia Sự Thật 2023. • University of Law Ho Chi Minh City, <i>Giáo trình luật Hiến pháp Việt nam</i>, NXB Hồng Đức 2023. • University of Law Ho Chi Minh City, <i>Giáo trình Luật hành chính</i>, NXB Hồng Đức 2022. • University of Law Ho Chi Minh City, <i>Giáo trình Luật hình sự Việt Nam</i>, NXB Hồng Đức 2022. • University of Law Ho Chi Minh City, <i>Giáo trình Luật dân sự Việt Nam</i>, NXB Hồng Đức 2022. • University of Law Ho Chi Minh City, <i>Giáo trình Luật lao động Việt Nam</i>, NXB Hồng Đức 2022. • University of Law Ho Chi Minh City, <i>Giáo trình pháp luật về chủ thể kinh doanh</i>, NXB Hồng Đức 2022.

2. 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

3. 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 • Introduction to structure of Vietnamese legal system	1-5 (level I - introduced)	Tests Peer evaluations Class-performance evaluations	Discussions Case studies	PPT - Introduction to Vietnamese legal system available on Blackboard
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	1-5 (Level R - reinforced)	Tests Peer evaluations Class-performance	Discussions Case studies, especially cases related	PPT– Criminal law available on Blackboard

	- Crimes - Punishments		evaluations	to corruption	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 dissolution of an enterprise	1-5 (Level I - Introduced)	Tests Peer evaluations Class-performance evaluations	Discussions Case studies	PPT– Law on enterprises available on Blackboard 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.)	1-5 (Level M -	Tests Peer evaluations	Discussions Case studies	PPT– Labor law available on

	• Employment contracts • Labor disciplines • Dispute settlements	Mastery)	Class-performance evaluations		Blackboard Labor code 2019 available on Blackboard
15	Revision/ Tutoring classes		Quizzes Projects		

4. 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.

5. 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 primary and secondary sources	Shows little information from sources. Poor handling of sources	Shows moderate amount of source information incorporated. Some key points supported by sources. Quotations may be poorly integrated into paragraphs. Some possible problems with source citations	Draws upon sources to support most points. Some evidence may not support arguments or may appear where inappropriate. Quotations integrated well into paragraphs. Sources cited correctly	Draws upon primary and secondary source information in useful and illuminating ways to support key points. Excellent integration of quoted material into paragraphs. Source cited correctly
4	CLO2	Use of frameworks	Shows no effort to structure	Shows limited ability to structure	Shows effort to link problems with the theoretical	Shows ability to structure problems in	Shows ability to structure problems in correspondence to

			problems in correspondence to theoretical frameworks	problems in correspondence to theoretical frameworks	frameworks. There are still some mistakes	correspondence to theoretical frameworks correctly. Minor mistakes in resolving problems	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.

Ho Chi Minh City, May 2023
Head of Office of Academic Affairs

Huỳnh Khả Tú



**VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY**
School of Languages

COURSE SYLLABUS

Course Name: Critical Thinking

Course Code: **PE008IU**

1. General information

Course designation	<i>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.</i> <i>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.</i> <i>Resources for the reasoning process include hypothetical and real-life situations in various fields of natural sciences, social sciences, and humanities.</i>
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: 127.5 Contact hours (lecture, exercise): 37.5 Private study including examination preparation, specified in hours: 90
Credits/ECTS	3 credits/4.64 ECTS
Required and recommended prerequisites for	None

joining the course		
Course objectives	This 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	
Course learning outcomes	Upon the successful completion of this course, students will be able to:	
	Competency level	Course learning outcome (CLO)
	Knowledge	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
	Skill	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
	Attitude	CLO9. Defend personal/group beliefs with good arguments and in appropriate manners (project presentations)

Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i>		
	Weight: lecture session (2.5 hours)		
	Teaching levels: I (Introduce); T (Teach); U (Utilize)		
	Topic	Weight	Level
	Introduction to Critical thinking	1	I, T, U
	Recognizing arguments	1	T, U
	Basic logical concepts	1	T, U
	A little categorical logic	1	T, U
	A little propositional logic	1	T, U
	Logical fallacies I	1	T, U
	Logical fallacies II	1	T, U
	Review for Midterm test	1	U
	Analyzing arguments	1	T, U
	Evaluating arguments and truth claims	1	T, U
	Inductive reasoning	1	T, U
Project: Group presentation	3	U	
Review for Final Exam	1	U	
Examination forms	40 multiple-choice questions for the midterm and final exams and group presentations for the final project		
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. Overall passing score: 50/100		
Reading list	[1] Bassham, Irwin, Nardone, and Wallace, <i>Critical Thinking: A Student's Introduction</i> , 6 th edition, McGraw-Hill Education, 2020. [2] Moore, B.N. et al. (2009). <i>Critical Thinking</i> , 9th ed. McGraw-Hill [3] Patrick J. Hurley (2012). <i>A Concise Introduction to Logic</i> (11 th ed.), Wadsworth, Cengage Learning + Relevant web resources		

2. Learning Outcomes Matrix (optional)

The relationship between Course Learning Outcomes (CLO) (1-4) and Intended Learning Outcomes (ILO) (1-10) of the EV program is shown in the following table:

CLOs		ILOs									
		Knowledge		Skills						Attitudes	
		1	2	3	4	5	6	7	8	9	10
Knowledge (Level: 1-6)	1	1									
	2	1									
	3	1									
Skill (Level: 1-7)	4							4			
	5								4		
	6								4		
	7										
	8										
Attitudes (Level: 1-5)	9										4
Contribution of CLOs to ILOs											
Bloom's Taxonomy	AVE	1.0						4.0	4.0	0.0	4.0
L,M,H conversion *		L						M	M		H

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

Week	Topic	CLO	Assessments	Learning activities	Resources
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	CLO1	CLO2	CLO3	CLO4	CLO5	CLO6	CLO7	CLO8	CLO9
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)

6.Date revised: 15 August, 2022

Ho Chi Minh City, 14 August 2023

By coordinator: Đỗ Thị Diệu Ngọc

Contact details:

Email: dtdngoc@hcmiu.edu.vn

Mobile: 0904361717



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Civil Engineering and Management

COURSE SYLLABUS

Course Name: Engineering Ethics and Professional Skills

Course Code: **PE020IU**

1. General Information

Module designation	PE020IU – Engineering Ethics and Professional Skills 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 for engineering issues encountered in academic and professional careers. This course also provides students with the professional skills: sharing ideas and concepts, team working, and presentation skills.
Semester(s) in which the module is taught	3
Person responsible for the module	Dr. Nguyen, Hoai Nghia, Dr. Huynh, Vo Trung Dung
Language	English
Relation to curriculum	Compulsory
Teaching methods	Lecture, presentation, and assignments.
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: 127.5 Contact hours (lecture): 37.5 Private study including examination preparation, specified in hours: 90
Credits/ECTS	3 credits/4.64 ECTS
Required and recommended prerequisites for joining the module	None
Module objectives/intended learning outcomes	Overall objectives are to equip IU students with knowledge about the philosophies of ethics, professional practice, and world culture. Students who complete the course will be able to perform the following tasks: (1) Having knowledge of the definition of engineering ethics, codes of ethics, ethic philosophies, intellectual property, copyright, and fair use of copyrighted materials and research data.

	(2) Using different problem-solving techniques to solve ethical dilemmas. (3) Analyzing social, environmental, legal aspects, safety and sustainability issues of engineering activities.																																				
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> 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 engineering professionalism and ethics</td><td>1</td><td>I</td></tr><tr><td>Engineers in Society</td><td>1</td><td>T, U</td></tr><tr><td>Moral choices and codes of ethics</td><td>1</td><td>T, U</td></tr><tr><td>Philosophical ethics</td><td>2</td><td>I, T, U</td></tr><tr><td>Ethical problem-solving techniques</td><td>1</td><td>T, U</td></tr><tr><td>Engineers at the Workplaces - Leadership</td><td>2</td><td>T, U</td></tr><tr><td>Truth in actions and words Academic and Research Ethics</td><td>1</td><td>T</td></tr><tr><td>Commitment to Safety</td><td>1</td><td>T, U</td></tr><tr><td>Internet ethics, Privacy Issues and Intellectual Property Rights</td><td>1</td><td>T, U</td></tr><tr><td>Environmental ethics Sustainable engineering</td><td>1</td><td>T</td></tr><tr><td>Review</td><td>1</td><td>T</td></tr></table>	Topic	Weight	Level	Introduction to engineering professionalism and ethics	1	I	Engineers in Society	1	T, U	Moral choices and codes of ethics	1	T, U	Philosophical ethics	2	I, T, U	Ethical problem-solving techniques	1	T, U	Engineers at the Workplaces - Leadership	2	T, U	Truth in actions and words Academic and Research Ethics	1	T	Commitment to Safety	1	T, U	Internet ethics, Privacy Issues and Intellectual Property Rights	1	T, U	Environmental ethics Sustainable engineering	1	T	Review	1	T
Topic	Weight	Level																																			
Introduction to engineering professionalism and ethics	1	I																																			
Engineers in Society	1	T, U																																			
Moral choices and codes of ethics	1	T, U																																			
Philosophical ethics	2	I, T, U																																			
Ethical problem-solving techniques	1	T, U																																			
Engineers at the Workplaces - Leadership	2	T, U																																			
Truth in actions and words Academic and Research Ethics	1	T																																			
Commitment to Safety	1	T, U																																			
Internet ethics, Privacy Issues and Intellectual Property Rights	1	T, U																																			
Environmental ethics Sustainable engineering	1	T																																			
Review	1	T																																			
Examination forms	Constructed-response test																																				
Study and examination requirements	Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed based on their class participation. Questions and comments are strongly encouraged. Assignments/Examination: Students must have more than 50/100 points overall to pass this module.																																				
Reading list	Textbook: [1] M. W. Martin and R. Schinzinger (2010). <i>Introduction to engineering ethics</i> McGraw-Hill Education 2nd edition [2] C. B. Fleddermann. (2011). <i>Engineering Ethics</i>, Pearson 4th edition																																				

2. Learning Outcomes Matrix (optional)

The relationship between Course Learning Outcomes (1-3) and Intended Learning Outcomes (ILO) is shown in the following table:

CLOs		ILOs									
		Knowledge		Skills						Attitudes	
		1	2	3	4	5	6	7	8	9	10
Knowledge (Level: 1-6)	1		2							2	
Skill (Level: 1-7)	2			3						3	
Attitudes (Level: 1-5)	3		4							4	
Contribution of CLOs to ILOs											
Bloom's Taxonomy	AVE	0.0	3.0	3.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0
L,M,H conversion *			M	M						M	

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
1	Introduction to engineering professionalism and ethics	1		Lecture, Discussion	[1] Chapter 1
2	Engineers in Society	1	HW1 and/or Quiz1	Lecture, HW1 and/or Quiz1	[1] Chapter 4
3	Moral choices and codes of ethics	1	Presentation 1	Lecture, Presentation1	[1] Chapter 2
4, 5	Philosophical ethics	1, 2	HW2 and/or Quiz2	Lecture, HW2 and/or Quiz2	[1] Chapter 3
6	Ethical problem-solving techniques	2	Presentation 2, HW3 and/or Quiz3	Lecture, HW3 and/or Quiz3	[4] Chapter 4
7, 8	Engineers at the Workplaces - Leadership	1	Quiz4	Lecture, Discussion Quiz4	[1] Chapter 6
9-10	FINAL EXAM				
11-12	Truth in actions and words Academic and Research Ethics	1, 3	Quiz5	Lecture, Quiz5	[1] Chapter 7
13	Commitment to Safety	1, 3	Quiz6	Lecture, Discussion Quiz6	[1] Chapters 5, 6
14-15	Internet Ethics Privacy Issues and Intellectual Property Rights	1, 3	Quiz7	Lecture, Discussion Quiz7	[1] Chapter 13
16	Environmental ethics Sustainable engineering	1, 3	Quiz8	Lecture, Discussion Quiz8	[1] Chapter 9
17	Review				

Week	Topic	CLO	Assessments	Learning activities	Resources
18-19	FINAL EXAM				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3
In-class exercises/quizzes (10%)	Qz1, Qz4, 50%Pass	Qz2, Qz3 50%Pass	Qz5, Qz6, Qz7, Qz8, 50%Pass
Homework exercises/ Presentation (20%)	Presentation 1 50%Pass	Presentation 2 50%Pass	
Midterm exam (20%)	MCQ, Case study 50% Pass	MCQ, Case study 50% Pass	
Final exam (50%)			MCQ, Case study 50% Pass

Note: %Pass: % students have scores greater than 50 out of 100.

5. Date revised: August 14, 2023

Ho Chi Minh City, 14/08/2023



**VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY**
School of Languages

COURSE SYLLABUS

Course Name: Writing AE1 (Academic Writing)

Course Code: EN007IU

1. General information

Course designation	<i>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.</i>
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: 85 Contact hours (lecture, exercise): 25 Private study including examination preparation, specified in hours: 60
Credits/ECTS	2 credits/3.09 ECTS
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
Course objectives	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.

Course learning outcomes	Upon the successful completion of this course, students will be able to:		
	Competency level	Course learning outcome (CLO)	
	Knowledge	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	
	Skill	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)	
Attitude	CLO5. Reason around ethical issues in writing academic essays and avoid committing plagiarism		
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i>		
	Weight: lecture session (2 hours)		
	Teaching levels: I (Introduce); T (Teach); U (Utilize)		
	Topic	Weight	Level
	The process of Academic Writing	1	I, T, U
	Using Outside Sources	3	T, U
	From Paragraph to Essay	4	T, U
	Process Essays	4	T, U
	Cause/Effect Essays	4	T, U
	Comparison/ Contrast Essays	4	T, U
	Argumentative Essays	6	T, U
Summarizing	2	U	
Review & Correction	2	U	
Examination forms	Essay writing		
Study and examination requirements	<i>Attendance</i> 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.		
	<i>Missed Tests</i> 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.		

	<i>Class Behaviors</i> 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: - 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. <i>Plagiarism</i> 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. <i>Writing Center (Room 509)</i> 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). <i>Longman Academic Writing Series, Level 4: Essays</i> (5th ed.). New Jersey, NJ: Pearson Longman. [2] Oshima, A., & Hogue, A. (2006). <i>Longman Academic Writing Series, Level 4: Essays</i> (4th ed.). New Jersey, NJ: Pearson Longman.

2. Learning Outcomes Matrix (optional)

The relationship between Course Learning Outcomes (CLO) (1-5) and Intended Learning Outcomes (ILO) (1-10) of the EV program is shown in the following table:

CLOs		ILOs									
		Knowledge		Skills						Attitudes	
		1	2	3	4	5	6	7	8	9	10
Knowledge (Level: 1-6)	1		2					2			
	2		3					3			
Skill (Level: 1-7)	3							3			
	4							2			
Attitudes (Level: 1-5)	5							2		2	
Contribution of CLOs to ILOs											
Bloom's Taxonomy	AVE	0.0	2.5	0.0	0.0	0.0	0.0	2.4	0.0	2.0	0.0
L,M,H conversion *			L					L		L	

3. Planned learning activities and teaching methods

Week	Coursebook		Homework
	Chapter	Pages	
1	The process of Academic Writing Step 1: Creating (Prewriting) Step 2: Planning (Outlining) Step 3: Writing Step 4: Polishing Using Outside Sources Paraphrasing Plagiarism and how to avoid plagiarism	[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 successful summary	[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 Many Languages (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 & Logical division of ideas Body paragraphs: - Topic sentences The concluding paragraph: - Restatement - Final thoughts Outlines of essays	[1] pp. 74 – 100	- Read pp. 101-15 - Do exercises on: - Writing thesis statements - Writing topic sentences from the thesis statement provided - Writing restatements

Week	Coursebook		Homework
	Chapter	Pages	
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 (150-200 words) 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 models Organization Signal words and phrases Write together: Write the introduction, ONE body paragraph 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 college students - 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: - The cause of obesity - The effects of involvement in sports on young children - The causes of stress in college students - The effects of regular reading on students' lives

Week	Coursebook		Homework
	Chapter	Pages	
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 body paragraph 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 in sports on young children • The causes of stress in college students The effects of regular reading on students' lives		• Give peer-feedback using the rubric provided
MID-TERM EXAMINATION			
9	Comparison/ Contrast Essays Introduction Analyzing the models Organization: • Points of comparison • Point-by-point organization • Block organization Comparison and Contrast signalwords Write together: Write the introduction, ONE body paragraph 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 the university culture in two different countries. • Compare and contrast the culture of a small town and a big city.	[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: ○ Compare and contrast the relationship between parents and children in two different cultures. ○ Compare and contrast the university culture in two different countries. ○ Compare and contrast the culture of a small town and a big city.

Week	Coursebook		Homework
	Chapter	Pages	
10	Comparison/ Contrast Essays (Cont'd) Review/ Correction: Lecturer gives 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 of the lecturer's choice: • Compare and contrast the relationship between parents and children in two different cultures • Compare and contrast the university 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

Week	Coursebook		Homework
	Chapter	Pages	
	Organization: Block vs. Point-by-point pattern The elements of an argumentative essay: • An explanation of the issue • A clear thesis statement • A summary of the opposing arguments • Rebuttals to the opposing arguments • Your own arguments The introductory paragraph: Thesis Statement Statistics as support Write together: Write the introduction, ONE body paragraph and the conclusion on one of the topics below or a topic of the lecturer's choice: • Can same-sex parenting negatively influence a child's mentality? • Do famous artists have an innate 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's mentality? ○ Do famous artists have an innate talent, or do they put in great 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 on the topic left or a topic of the lecturer's choice: • Can same-sex parenting negatively influence a child's mentality? • Do famous artists have an innate talent, or do they put in great effort to improve their skills? • Is homework helpful?		• Give peer-feedback using the rubric provided
14	Review & Practice: Summarizing		Sample final test

Week	Coursebook		Homework
	Chapter	Pages	
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			

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4	CLO5
Homework completion (10%)	80% Pass	80% Pass	80% Pass		
Week 6: In-class writing assignment: Process essay (10%)				80% Pass	
Week 10: In-class writing assignment: Compare & Contrast essay (10%)				80% Pass	
Midterm exam (30%)	80% Pass			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)

5.1. Midterm exam rubrics (100 points)

TASK 1: Write 3 topic sentences and the restatement from a thesis statement: 40 points

Parts/ Points	Answers/ Criteria	CLO
Topic sentence 1 10 pts	○ The topic sentence introduces the topic and the controlling idea (1), starting with a transition signal*.	CLO 1
Topic sentence 2 10 pts	○ The topic sentence introduces the topic and the controlling idea (2), starting with a transition signal*.	CLO 1
Topic sentence 3 10 pts	○ The topic sentence introduces the topic and the controlling idea (3), starting with a transition signal*.	CLO 1
Restatement 10 pts	○ The 3 subtopics are well paraphrased: different words and structures while the meaning kept the same.	CLO 1

Notes:

*The students are supposed to use **a variety of connecting devices (single word, phrase, clause, or sentence)** to show their flexibility and expertise in writing.

TASK 2: Write a Cause/Effect essay: 60 points

Answers/ Criteria	Parts/ Points	CLO
Language use and Mechanics A wide variety of sentence patterns and vocabulary are presented correctly. Language used for <i>Cause-Effect Essay</i> is good and Meaning is clear. Spelling, capitalization, punctuation are correct.	10	CLO 1,4

Answers/ Criteria	Parts/ Points	CLO
Content The essay fulfills the requirements of the assignment & the topic is fully addressed. (15) The essay is interesting to read and originally written by the student. (5)	20	CLO 1,4,5
Organization Introduction: The introduction ends with a thesis statement. (10) Body: Each paragraph discusses a particular point and begins with a clear topic sentence. (5) Each paragraph has specific supporting details (fact, examples, etc.) (5) Each paragraph has cohesion and coherence. (5) Conclusion: The conclusion summarizes the main points/paraphrases the thesis statement, begins with a conclusion signal, and leaves the readers with the writer's thoughts on the topic. (5)	30	CLO 1,4
Total	60	

5.2. Final exam rubrics: Write an argumentative essay: 100 points

Criteria/ word count	300-350 words (100%)	200-299 words (80%)	Under 200 words (60%)	CLO
Language use and mechanics (20) A wide variety of sentence patterns and vocabulary are presented correctly. Language control is good, and meaning is clear. Spelling, capitalization and punctuation are correct.	20	16	12	CLO 1,4
Content: (20) The essay fulfills the task requirements, and the topic is fully addressed. The content is originally created by the students.	20	16	12	CLO 1,4,5

Organization: (60) Introduction: The introduction has a thesis statement. (10) Body: At least one paragraph discusses the counter-arguments. (10) Each paragraph discusses a particular point and begins with a clear topic sentence. (10) Each paragraph has specific supporting details (fact, examples, etc.). There are no sentences that are off-topic. (10) Each paragraph has cohesion and coherence. There are transition signals to show the relationship among ideas and to link paragraphs. (10) Conclusion: The conclusion summarizes the main points and paraphrases the thesis statement, begins with a conclusion signal, and leaves the readers with the writer's final thought on the topic. (10)				
	10	8	6	
	10	8	6	
	10	8	6	
	10	8	6	CLO 1,4
	10	8	6	
Total	100	80	60	

Date revised: 14 August, 2023

Ho Chi Minh City, 14 August 2023



**VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY**
School of Languages

COURSE SYLLABUS

Course Name: Listening AE1 (Listening & Note-taking)

Course Code: **EN008IU**

1. General information

Course designation	<i>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.</i>
Semester(s) in which the course is taught	1, 2, 3
Person responsible for the course	Lecturers of School of Languages
Language	English
Relation to curriculum	Compulsory
Teaching methods	Lecture, lesson
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: 85 Contact hours (lecture, exercise): 25 Private study including examination preparation, specified in hours: 60
Credits/ECTS	2 credits/3.09 ECTS
Required and recommended prerequisites for joining the course	Students must fulfill 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
Course objectives	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.		
Course learning outcomes	Upon the successful completion of this course, students will be able to:		
	Competency level	Course learning outcome (CLO)	
	Knowledge	CLO1. Remember different strategies and techniques in listening to academic lectures and taking notes. CLO2. Improve their specialized knowledge of academic lectures	
	Skill	CLO3. Respond to academic lectures with appropriate strategies CLO4. Communicate effectively with their classmates and professors.	
	Attitude	CLO5. Respond to academic lectures with confidence	
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> Weight: lecture session (2 hours) Teaching levels: I (Introduce); T (Teach); U (Utilize)		
	Topic	Weight	Level
	Orientation & Introduction of strategies and techniques in note-taking	2	I, T, U
	Chapter 1: New Trends in Marketing Research	3	T, U
	Chapter 2: Business Ethics	3	T, U
	Chapter 3: Trends in Children’s Media Use	2	T, U
	Chapter 4: The Changing Music Industry	2	T, U
	Chapter 5: The Placebo Effect	2	T, U
	Midterm Sample Test & Review	2	T, U
	Chapter 6: Intelligent Machines	3	T, U
	Chapter 7: Sibling Relationships	3	T, U
	Chapter 8: Multiple Intelligences	3	T, U
	Chapter 9: The Art of Graffiti	3	T, U
	Final Sample Test & Review	2	T, U

Examination forms	Paper and pen tests: Correct the mistakes, Fill in the blanks, Write short answers, Write a summary paragraph.
Study and examination requirements	<i>Attendance</i> 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. <i>Missed tests</i> 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.) <i>Class behavior</i> Students are supposed to: prepare thoroughly for each class in accordance with the syllabus and complete all assignments 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). <i>Lecture ready 3</i>. Oxford: Oxford University Press. References: [2] Frazie, L., & Leeming, S. (2013). <i>Lecture ready 1, 2</i>. Oxford: Oxford University Press.

2. Learning Outcomes Matrix (optional)

The relationship between Course Learning Outcomes (CLO) (1-4) and Intended Learning Outcomes (ILO) (1-10) of the EV program is shown in the following table:

CLOs		ILOs									
		Knowledge		Skills						Attitudes	
		1	2	3	4	5	6	7	8	9	10
Knowledge (Level: 1-6)	1							1			
	2		3					3			
Skill (Level: 1-7)	3							2			
	4							4			
Attitudes (Level: 1-5)	5							2		2	
Contribution of CLOs to ILOs											
Bloom's Taxonomy	AVE	0.0	3.0	0.0	0.0	0.0	0.0	2.4	0.0	2.0	0.0
L,M,H conversion *			M					L		L	

3. Planned learning activities and teaching methods

WEEK	P.	Chapter	Listening oriented activities	Speaking oriented activities
WEEK 1	2	ORIENTATION		

WEEK	P.	Chapter	Listening oriented activities	Speaking oriented activities
WEEK 2	2	<u>Chapter 1</u> New Trends in Marketing Research	Recognizing topic introducing and lectureplan presenting expressions Organizing ideas by outlining	Expressing ideas during a discussion
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 Music Industry	Recognizing expressions for clarification or emphasis Organizing notes byusing a split-page format	Expressing interest and asking for elaboration during a discussion
WEEK 7	2	<u>Chapter 5</u> The Placebo Effect	Recognizing cause andeffect expressions Noting causes and effects	Agreeing and disagreeing during a discussion
WEEK 8	2	Sample test correction 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 compromise and reach a consensus during a discussion
WEEK 10	2	REVIEW		

WEEK	P.	Chapter	Listening oriented activities	Speaking oriented activities
WEEK 11	2	Chapter 7 Sibling Relationships	Recognizing expressions of comparison and contrast Noting comparison and contrast	Expanding on ideas during a discussion
WEEK 12	2	Chapter 8 Multiple Intelligences	Recognizing non-verbal signals indicating important information Representing information in list form	Keeping the discussion on topic
WEEK 13	2	REVIEW		
WEEK 14	2	Chapter 9 The Art of Graffiti	Recognizing expressions of definition Reviewing and practicing all note taking strategies	Indicating to other when preparing 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)

6. Date revised: 14 August, 2023

Ho Chi Minh City, 14 August 2023



**VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY**
School of Languages

COURSE SYLLABUS

Course Name: Writing AE2 (Research Paper Writing)

Course Code: **EN011IU**

1. General information

Course designation	<i>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.</i>
Semester(s) in which the course is taught	1, 2, 3
Person responsible for the course	Lecturers of School of Languages
Language	English
Relation to curriculum	Compulsory
Teaching methods	Lecture, lesson, project
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: 85 Contact hours (lecture, exercise): 25 Private study including examination preparation, specified in hours: 60
Credits/ECTS	2 credits/3.09 ECTS
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	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> 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	<i>Attendance</i> 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. <i>Assignment (Literature review)</i> 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. <i>Missed Tests</i> 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. <i>Class Behaviors</i> 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. <i>Plagiarism</i> 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 border="1"> <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. <i>Writing Center (Room 509)</i> Students are encouraged to visit the Writing Center or to schedule an appointment for additional help.	Degree of magnitude	Description	Below 15%	Marked as it is.	15% - 25%	The score is deducted by 25%.	25% - 40%	The score is deducted by 50%	Over 40%	The score is 0.
Degree of magnitude	Description										
Below 15%	Marked as it is.										
15% - 25%	The score is deducted by 25%.										
25% - 40%	The score is deducted by 50%										
Over 40%	The score is 0.										
Reading list	[1] Hamp-Lyons, L., & Heasley, B. (2006). <i>Study Writing</i>. Cambridge, UK: Cambridge University Press [2] Articles and Essays taken from <i>The Allyn and Bacon Guide to Writing</i> by Ramage et al (2009), Pearson Longman. [3] Cormack, J. & Slaughter, J. (2009). <i>English for academic study: Extended writing and research skills</i>. Cambridge: Cambridge University Press. Garnet Education [4] Folse, K. S. & Pugh, T. (2010). <i>Great writing 5: Greater essays</i>. Boston: Heinle, Cengage Learning. [5] Keezer, S. (Ed.) (2003). <i>Write your research report: A real-time guide</i>. New Jersey: Pearson Learning Group. [6] Kumar, R. (2019). <i>Research methodology: A step-by-step guide for beginners</i>. Sage Publications										

2. Learning Outcomes Matrix (optional)

The relationship between Course Learning Outcomes (CLO) (1-4) and Intended Learning Outcomes (ILO) (1-10) of the EV program is shown in the following table:

CLOs		ILOs									
		Knowledge		Skills						Attitudes	
		1	2	3	4	5	6	7	8	9	10
Knowledge (Level: 1-6)	1		3		3			3			
Skill (Level: 1-7)	2							3			
	3							3			
Attitudes (Level: 1-5)	4							3		3	
Contribution of CLOs to ILOs											
Bloom's Taxonomy	AVE	0.0	3.0	0.0	3.0	0.0	0.0	3.0	0.0	3.0	0.0
L,M,H conversion *			M		M			M		M	

3. Planned learning activities and teaching methods

WEEK	CONTENT—SUGGESTED TASKS	ASSIGNMENT/ HOMEWORK
1	Orientation of the Course Unit 1: The Academic Writing Process Introduction	
2	Unit 1: 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	Unit 2: Researching and Writing Recognizing categories and classification The language of classification The structure of a research paper	HW: Task 17
4	Unit 3: 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	Unit 3: Fundamentals & Feedback (Cont.) The research paper Identifying a research gap The writing process	Assignment 1: Task 20
6	Unit 4: Definitions, Vocabulary & Clarity The clarity principle The language of definition The place of definition The writing process	HW: Task 15
7	Unit 5: Generalizations, Facts and Honesty Honesty principle The language of generalization	HW: Task 13
8	Unit 5: 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		

WEEK	CONTENT—SUGGESTED TASKS	ASSIGNMENT/ HOMEWORK
9	<u>Unit 6: Seeing Ideas and Sharing Texts</u> Writing about events in time Connecting events Learning about peer reviews	HW: Tasks 12 & 13
10	<u>Unit 7: Description, Methods & Reality</u> 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: Results, Discussion & Relevance</u> What is an argument? The language of argument The Results and Discussion sections Finding an academic voice	HW: Task 9
12	<u>Unit 9: The Whole Academic Text</u> 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: Creating the Whole Text</u> Structure of the research paper Creating your own research	
14	<u>Unit 10: Creating the Whole Text</u> 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: <i>use vocabulary and grammatical structures</i>		20	CLO 1,3,4
Total		100	

6. Date revised: 14 August, 2023

Ho Chi Minh City, 14 August 2023



**VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY**
School of Languages

COURSE SYLLABUS

Course Name: Speaking AE2 (Effective Presentations)

Course Code: **EN012IU**

1. General information

Course designation	<i>Giving presentations today becomes a vital skill for students to succeed not only in the 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).</i>
Semester(s) in which the course is taught	1, 2, 3
Person responsible for the course	Lecturers of School of Languages
Language	English
Relation to curriculum	Compulsory
Teaching methods	Lecture, lesson, mini presentations
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: 85 Contact hours (lecture, exercise): 25 Private study including examination preparation, specified in hours: 60
Credits/ECTS	2 credits/3.09 ECTS
Required and recommended prerequisites for joining the course	Students must complete AE1 courses
Course objectives	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.

Course learning outcomes	Upon the successful completion of this course, students will be able to:		
	Competency level	Course learning outcome (CLO)	
	Knowledge	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	
	Skill	CLO2. Prepare and deliver effective, formal, structured presentations that are appropriate to the specific environment and audience.	
Attitude	CLO3. Deliver both informative and persuasive speech with confidence		
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i>		
	Weight: lecture session (2 hours)		
	Teaching levels: I (Introduce); T (Teach); U (Utilize)		
	Topic	Weight	Level
	Orientation & Introduction	2	I, T, U
	Needs analysis		
	Building up confidence	2	T, U
	The first few minutes	2	T, U
	Organizing what you want to say	2	T, U
	Summarizing and concluding	2	T, U
	Using equipment	2	T, U
	Delivery techniques: Putting it all together	2	T, U
	Group presentations for the instructor’s evaluation and advice	2	U
	Introduction to persuasive speeches	2	T, U
	Methods of persuasion	2	T, U
	Maintaining interest	2	T, U
	Dealing with problems and questions	2	T, U
	Body language	2	T, U
Individual presentations for the instructor’s evaluation and advice	4	U	
Examination forms	Oral Presentations		

Study and examination requirements	<i>Attendance</i> 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. <i>Missed Tests</i> 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. <i>Class Behaviors</i> 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. <i>Plagiarism</i> 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). <i>Presenting</i>. Singapore: Cengage Learning [2] Comfort, J. (1997). <i>Effective presentations</i>. Oxford: Oxford University Press [3] Lucas, S. (2014). <i>The art of public speaking</i> (12th edition). New York: McGraw-Hill Education. [4] Harrington, D., & Lebeau, C. (2009). <i>Speaking of speech</i>. Macmillan

2. Learning Outcomes Matrix (optional)

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

CLOs		ILOs									
		Knowledge		Skills						Attitudes	
		1	2	3	4	5	6	7	8	9	10
Knowledge (Level: 1-6)	1		2							2	
Skill (Level: 1-7)	2			3						3	
Attitudes (Level: 1-5)	3		4							4	
Contribution of CLOs to ILOs											
Bloom's Taxonomy	AVE	0.0	3.0	3.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0
L,M,H conversion *			M	M						M	

3. Planned learning activities and teaching methods

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

WEEK 4	Unit 3: Organizing what you want to say	• <i>Presenting</i>, pp. 22-27) • <i>Effective Presentations</i>: 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	• <i>Presenting</i>, pp. 40-45 • <i>Effective Presentations</i>: p.41 + video clip	Students will: • look at ways of finishing a presentation effectively • learn useful phrases for ending their presentation, summarizing, handing over and thanking
WEEK 6	Unit 2: Using equipment	• <i>Presenting</i>, pp. 14-21) • <i>Effective Presentations</i>: p.31 + video clip	Students will: • use equipment and visuals to support their presentation • learn useful phrases for referring to visuals, ensuring their audience can see and expanding on notes
WEEK 7	Delivery techniques: Putting it all together	[2] <i>Effective Presentations</i> : p.50 + video clip Assignment: Topic(s) for group presentation)	Students will: • watch a model presentation and discuss do's and don'ts for effective delivery • 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] <i>The art of public speaking</i> , Chapter 15 (Handout given by the instructor)	Students will: • know types of persuasive speeches • know typical organizations of a persuasive speech

WEEK 10	Methods of persuasion	[3] <i>The art of public speaking</i> , 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: Maintaining interest	• <i>Presenting</i>: pp. 28-33) • <i>Effective Presentations</i>: p.25 + video clip)	Students will: • look at maintaining interest through effective delivery • learn useful phrases for clarifying what you mean, checking if the audience is following and involving the audience
WEEK 12	Unit 5: Dealing with problems and questions	○ <i>Presenting</i>: pp. 34-39) ○ <i>Effective Presentations</i>: p.44 (Question time)	Students will: • learn strategies for coping in unexpected situations • learn useful phrases for dealing with problems and questions
WEEK 13	Unit 6: Body language	[2] <i>Effective Presentations</i> : pp.36-39	Students will: • practise using language and body language to communicate the message clearly and persuasively • watch video clips about body language • 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 and advice	(to be determined by the instructor)	Students will: • consult the instructor for advice on the 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 be determined			

4. Assessment plan

	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

Assessment Type	CLO1	CLO2	CLO3
On-going Assessment (30%) (discussion, group presentation, individual presentation, and so on) <i>(It is requested that lecturers collect students' scripts or any type of evidence of their participation for possible fact check).</i>	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.

5. Rubrics & Marksheets

5.1. Midterm exam rubrics and marksheets



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 (<i>Good morning ladies and gentlemen. My name is ___. I'm a ___</i>)	☐	☐
b. Purpose/ Objective (<i>The purpose of this talk is to ___</i>)	☐	☐
c. Connect with the audience (<i>I can see that all of you love to ___</i>)	☐	☐
d. Outline/ Main part (<i>I've divided my presentation into ___ parts</i>)	☐	☐
e. Questions (<i>Should you have any questions, please save them until the end of my presentation</i>)	☐	☐
B. Body (<i>Transitions: Let's start with ___/ That brings me to ___/ Firstly, Secondly, Next, Lastly</i>)	☐	☐
C. Ending		
a. Signaling the end (<i>That brings me to the end of my presentation</i>)	☐	☐
b. Summary (<i>Let me just run over the key points again</i>)	☐	☐
c. Closing (<i>Thank you very much for your attention</i>)	☐	☐
d. Inviting questions (<i>I'd be glad to answer any questions you might have</i>)	☐	☐

Examiner :

5.2.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



Student name :
Topic :

Student ID :

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

- Greeting, name, position (Good morning, ladies and gentlemen. My name is ___. I'm a ___)
- Connect with the audience (I can see that all of you love to ___)
- Purpose/ Objective (The purpose of this talk is to ___)
- Time length (My presentation should last for ___)
- Outline/ Main part (I've divided my presentation into ___ parts)
- 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

- Signaling the end (That brings me to the end of my presentation)
- Summary (Let me just run over the key points again)
- Closing (Thank you very much for your attention)
- Inviting questions (I'd be glad to answer any questions you might have)

☐	☐
☐	☐
☐	☐
☐	☐

Examiner : _____



**VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY**
Department of Mathematics

COURSE SYLLABUS
Course Name: Calculus 1

Course Code: **MA001IU**

1. General information

Course designation	This course equip 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	
Language	English
Relation to curriculum	Compulsory
Teaching methods	Lectures, assignments
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: 170 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 50 (lectures) Private study including examination preparation, specified in hours: 120
Credits/ECTS	4 credits/6.18 ECTS
Required and recommended prerequisites for joining the course	None
Course objectives	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 skills creatively to new situations		
Course learning outcomes	Upon the successful completion of this course students will be able to:		
	Competency level	Course learning outcome (CLO)	
	Knowledge	CLO1. Have basic knowledge of limits and derivatives (Program outcomes: a) CLO2. Have basic knowledge of definite/indefinite integrals (Program outcomes: a)	
	Skill	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)	
	Attitude	CLO5. Confident when dealing with derivatives and integrals. Comfortable with using derivatives and integrals in practical situations. (Program outcome: j, k)	
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 and 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.	1	I, T, U

	The Fundamental Theorem of Calculus, Integration by Substitution		
	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, <i>Calculus</i> , Thomson Learning, 7 th edition, 2012.		

2. Learning Outcomes Matrix (optional)

The relationship between Course Learning Outcomes (CLO) (1-5) and Intended Learning Outcomes (ILO) (1-10) of the EV program is shown in the following table:

CLOs		ILOs									
		Knowledge		Skills						Attitudes	
		1	2	3	4	5	6	7	8	9	10
Knowledge (Level: 1-6)	1	2									
	2	2									
Skill (Level: 1-7)	3	2									
	4	2			2		2				
Attitudes (Level: 1-5)	5	3			3					3	
Contribution of CLOs to ILOs											
Bloom's Taxonomy	AVE	2.2	0.0	0.0	2.5	0.0	2.0	0.0	0.0	3.0	0.0
L,M,H conversion *		L			L		L			M	

3. Planned learning activities and teaching methods

Week	Topics	CLO	Assessment	Teaching and Learning activities
1	Functions and Graphs, Inverse Functions, Exponential and Logarithmic Functions	1,3		Lecture

Week	Topics	CLO	Assessment	Teaching and Learning activities
2	Parametric Curves, Limit. One-sided Limits, Laws of Limits.	1,3	Quiz	Lectures and Quiz
3	Evaluating Limits. The Squeeze Theorem. Continuity. The Intermediate Value Theorem	3, 5	Quiz	Lectures and Quiz
4	The Tangent and Velocity Problems. Rates of Change, The Derivative.	3, 5	HW1	Lectures and HW
5	Higher-Order Derivatives, Rules of Differentiation. Rates of Change in the Natural and Social Sciences	3, 5	Quiz	Lectures and Quiz
6	Implicit Differentiation, Differentiation of Inverse Functions,	3, 5	HW2	Lectures and HW
7	Logarithmic Differentiation, Linear Approximations. Differentials.	3, 5	Quiz	Lectures and Quiz
8	Related Rates, Maxima and Minima. Critical Point, The Mean Value Theorem.	3, 5	HW3	Lectures and HW
Midterm Exam				
9	The First and Second Derivative Test, Concavity. Shapes of Curves, Curve Sketching	2, 4	Quiz	Lectures and Quiz
10	Indeterminate Forms and l'Hôpital's Rules, Maxima and Minima Problems, Newton's Method	2, 4	Quiz	Lectures and Quiz
11	Anti-derivatives and Indefinite Integrals, The Definite Integral	4, 5	HW4	Lectures and HW
12	Properties of the Definite Integral. The Fundamental Theorem of Calculus, Integration by Substitution	2, 4	Quiz	Lectures and Quiz
13	Integration by Parts, Partial Fractions, Numerical Integration,	4, 5	Quiz	Lectures and Quiz
14	Improper Integrals, Areas between Curves Areas Enclosed by Parametric Curves	2, 4, 5	HW5	Lectures and HW
15	Volumes, Arc Length, Applications to Engineering, Economics and Science	1, 2, 3, 4, 5	Exercises	

Week	Topics	CLO	Assessment	Teaching and Learning activities
Final Exam		1, 2, 3, 4, 5		

4. 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.

5. Date revised: August 14, 2023

Ho Chi Minh City, 14/8/2023



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Calculus 2

(Toán 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	
Teaching schedule	☐ Year 1 ☐ Year 2 ☐ Year 3 ☐ Year 4 ☐ Year 5 ☒ Semester 1 ☒ Semester 2 ☐ Summer	
Person In-Charge	Assoc. Prof. Mai Duc Thanh, mdthanh@hcmiu.edu.vn Assoc. Prof. Tran Vu Khanh, tvkhanh@hcmiu.edu.vn Dr. Nguyen Minh Quan, quannm@hcmiu.edu.vn Dr. Nguyen Anh Tu, natu@hcmiu.edu.vn Dr. Ta Quoc Bao, baotq@hcmiu.edu.vn	
Language	English	
Relation to curriculum	☒ General ☐ Fundamental ☐ Specialization ☐ Project/Internship/Thesis	☒ Compulsory ☐ Elective
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify:	

Workload			Lecture	Lab	Project	Internship	Thesis
		<i>Credit</i>	4				
	Contact hours	50	50	0	0	0	0
	Self-Study hours	120	120	0	0	0	0
	Total workload	170	170	0	0	0	0
Credit points	4						
Requirements for taking the course	☐ None ☒ Prerequisite course: (<i>Calculus 1, MA001IU</i>) ☐ Parallel course: (<i>Please specify course ID & course title, if any</i>) ☐ Previous course: (<i>Please specify course ID & course title, if any</i>)						
Course objectives	1. 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. 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 skills creatively to new situations						
Course learning outcomes	Upon the successful completion of this course, students will be able to:						
	Competency level¹	Course learning outcome (CLO)					
	Knowledge	CLO1. Comprehend basic knowledge of series, functions of several variables, multiple integrals. [Understanding] CLO2. Comprehend basic knowledge of vector calculus. [Understanding]					

¹ Level of competence according to Bloom's Taxonomy:

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x
Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination
Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x

	<table><tr><td>Skill</td><td>CLO3. Perform computation of partial derivatives, multiple integral. [Mechanism] CLO4. Display the convergence of a sequence and a series and use power series to simplify computation. Display the optimal problem using partial derivatives, compute the volume of an object in higher dimension by using the multiple integrals. [Mechanism]</td></tr><tr><td>Attitude</td><td>CLO5. Display confidence when dealing with partial derivatives, multiple integrals. Display confidence with using partial derivatives and multiple integrals in practical situations. [Organization]</td></tr></table>	Skill	CLO3. Perform computation of partial derivatives, multiple integral. [Mechanism] CLO4. Display the convergence of a sequence and a series and use power series to simplify computation. Display the optimal problem using partial derivatives, compute the volume of an object in higher dimension by using the multiple integrals. [Mechanism]	Attitude	CLO5. Display confidence when dealing with partial derivatives, multiple integrals. Display confidence with using partial derivatives and multiple integrals in practical situations. [Organization]																																												
Skill	CLO3. Perform computation of partial derivatives, multiple integral. [Mechanism] CLO4. Display the convergence of a sequence and a series and use power series to simplify computation. Display the optimal problem using partial derivatives, compute the volume of an object in higher dimension by using the multiple integrals. [Mechanism]																																																
Attitude	CLO5. Display confidence when dealing with partial derivatives, multiple integrals. Display confidence with using partial derivatives and multiple integrals in practical situations. [Organization]																																																
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> <u>Weight</u>: lecture session (2.5 hours) <u>Teaching levels</u>: I (Introduce); T (Teach); U (Utilize) <table><tr><th>No.</th><th>Topic</th><th>Weight</th><th>Level</th></tr><tr><td>1</td><td>Sequences and Convergence</td><td>1</td><td>I, T</td></tr><tr><td>2</td><td>Series</td><td>1</td><td>I, T</td></tr><tr><td>3</td><td>Tests for Convergence</td><td>1</td><td>T, U</td></tr><tr><td>4</td><td>Power series</td><td>1</td><td>T, U</td></tr><tr><td>5</td><td>Representations of Functions as Power series</td><td>1</td><td>T, U</td></tr><tr><td>6</td><td>Taylor and Maclaurin series</td><td>1</td><td>T, U</td></tr><tr><td>7</td><td>Vector Functions and Space Curves, Limit and continuity of vector functions</td><td>1</td><td>I, T</td></tr><tr><td>8</td><td>Derivatives and Integrals of vector functions, Length of space curves</td><td>1</td><td>T, U</td></tr><tr><td>9</td><td>Functions of Several Variables, Limits and Continuity</td><td>1</td><td>I,T</td></tr><tr><td>10</td><td>Partial Derivatives, Tangent Plane and Linear Approximations</td><td>1</td><td>T, U</td></tr><tr><td>11</td><td>Chain Rules, Directional Derivatives and Gradient</td><td>1</td><td>T, U</td></tr></table>	No.	Topic	Weight	Level	1	Sequences and Convergence	1	I, T	2	Series	1	I, T	3	Tests for Convergence	1	T, U	4	Power series	1	T, U	5	Representations of Functions as Power series	1	T, U	6	Taylor and Maclaurin series	1	T, U	7	Vector Functions and Space Curves, Limit and continuity of vector functions	1	I, T	8	Derivatives and Integrals of vector functions, Length of space curves	1	T, U	9	Functions of Several Variables, Limits and Continuity	1	I,T	10	Partial Derivatives, Tangent Plane and Linear Approximations	1	T, U	11	Chain Rules, Directional Derivatives and Gradient	1	T, U
No.	Topic	Weight	Level																																														
1	Sequences and Convergence	1	I, T																																														
2	Series	1	I, T																																														
3	Tests for Convergence	1	T, U																																														
4	Power series	1	T, U																																														
5	Representations of Functions as Power series	1	T, U																																														
6	Taylor and Maclaurin series	1	T, U																																														
7	Vector Functions and Space Curves, Limit and continuity of vector functions	1	I, T																																														
8	Derivatives and Integrals of vector functions, Length of space curves	1	T, U																																														
9	Functions of Several Variables, Limits and Continuity	1	I,T																																														
10	Partial Derivatives, Tangent Plane and Linear Approximations	1	T, U																																														
11	Chain Rules, Directional Derivatives and Gradient	1	T, U																																														

	12	Maximum and Minimum Values of Functions of two variables	1	T, U
	13	Lagrange Multipliers and Applications	1	T, U
	14	Double Integrals in Rectangles, Iterated Integrals	1	I, T
	15	Double, Triple Integrals in General regions and Applications	2	T,U
Examination forms	☐ Multiple-choice questions ☐ Oral examination ☐ Report ☒ Written examination ☐ Presentation ☐ Others, please specify: ☐ Assignments			
Other requirements	<u>Attendance:</u> 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. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.			
Reading list	I. Textbooks [1] J. Stewart, Calculus, Thomson Learning, 7th edition, 2012. II. References N/A			

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-5) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	4						
	2	4						
Skills (Level: 1-7)	3					3		
	4					3		
Attitudes (Level: 1-5)	5							
	.							
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	4.0	0.0	0.0	0.0	3.0	0.0	0.0
L,M,H conversion*		H				M		

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Sequences, Series, The Integral Test and Estimates Sums, The comparison Tests	2, 4	HW	Lectures and Quiz	[1]
2.	2	Alternating Series, Absolute Convergence and the Ratio and Roots Tests, Strategy for Testing Series	2, 4	HW	Lectures and Quiz	[1]
3.	3	Power Series, Representations of Functions as Power Series, Taylor & Maclaurin Series, Applications of Taylor Polynomials	4, 5	Quiz	Lectures and Quiz	[1]
4.	4	3D Coordinate Systems, Vectors, The Dot Product, The Cross Product, Equations of Lines and Planes, Functions of Surface.	2, 4	HW	Lectures and Quiz	[1]
5.	5	Vector Functions and Space Curves,	4, 5	HW	Lectures and Quiz	[1]

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
		Derivatives and Integrals of Vector Functions, Arc Length, Parametric Surfaces				
6.	6	Functions of Several Variables, Limit and Continuity,	2, 4, 5	Quiz	Lectures and Quiz	[1]
7.	7	Partial Derivatives, Tangent Planes and Linear Approximations,	3, 5	HW	Lectures and Quiz	[1]
8.	8	Chain Rule, Directional Derivatives and Gradient Vectors,	3, 5	HW	Lectures and Quiz	[1]
9.		Midterm				
10.	9	Maximum and Minimum Values, Lagrange Multipliers	2, 4	HW	Lectures and Quiz	[1]
11.	10	Double Integrals over Rectangles, Iterated Integrals, Double Integrals over General Regions	2, 4	HW	Lectures and Quiz	[1]
12.	11	Double Integrals in Polar Coordinates, Application of Double Integrals.	4, 5	HW	Lectures and Quiz	[1]
13.	12	Triple Integrals, Triple Integrals in Cylindrical and Spherical Coordinates. Change of Variables in Multiple Integrals	2, 4	Quiz	Lectures and Quiz	[1]
14.	13	Vector Fields, Line Integrals, the Fundamental Theorem for Line Integrals	4, 5	HW	Lectures and Quiz	[1]
15.	14	Green's Theorem, Curl and Divergence, Surface Integrals	2, 4, 5	HW	Lectures and Quiz	[1]
16.	15	Stokes' Theorem, Divergence Theorem.	1, 2, 3, 4, 5	Exercises		[1]
17.		Final exam				

4. 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%Pass	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.

5. Rubrics (optional): No

6. Revision Date: May 20, 2023

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



**VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY**
Department of Physics

COURSE SYLLABUS

Course Name: Physics 1 (General Mechanics)

Course Code: **PH013IU**

1. General information

Course designation	<i>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.</i>
Semester(s) in which the course is taught	1, 2
Person responsible for the course	Assos. Prof. Phan Bảo Ngọc Dr. Đỗ Xuân Hội Dr. Phan Hiền Vũ Dr. Trần Nguyên Lâm Dr. Nguyễn Quang
Language	English
Relation to curriculum	Compulsory
Teaching methods	Lecture, lesson, assignment.
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: 85 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): lecture: 25 Private study including examination preparation, specified in hours: 60
Credit points/ECTS	2 credits/ 3.09 ECTS
Required and recommended prerequisites for joining the course	None

Course objectives	This course will provide students with: 1. The basic knowledge of general Mechanics 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.		
Course learning outcomes	Upon the successful completion of this course students will be able to:		
	Competency level	Course learning outcome (CLO)	
	Knowledge	CLO1. Understand basic knowledge of kinematics, dynamics, and laws of conservation of a mechanical system. CLO2. Apply knowledge of physics to solving problems in science and engineering	
	Skill	CLO3. Apply skills to analyzing and solving problems in science and engineering	
	Attitude	CLO4. Communicate effectively in writing manner	
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> Weight: lecture session (2 hours) Teaching levels: I (Introduce); T (Teach); U (Utilize)		
	Topic	Weight	Level
	Chapter 1: Bases of Kinematics	2	I, T,U
	Chapter 2: The Law of Motion	2	I, T,U
	Chapter 3: Work and Mechanical Energy	3	I, T,U
	Chapter 4: Linear Momentum and Collisions	2	I, T,U
	Chapter 5: Rotation of a Rigid Object About a Fixed Axis	2	I, T,U
	Chapter 6: Equilibrium and Elasticity	2	I
	Chapter 7: Universal Gravitation	2	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] Lecture Notes [2] Halliday D., Resnick R. and Walker, J. (2011) <i>Principles of Physics</i>, 9th edition, John Wiley and Sons, Inc. [3] Alonso M. and Finn E.J. (1992) <i>Physics</i>, Addison-Wesley Publishing Company. [4] Faughn/Serway (2006) <i>Serway's College Physics</i>, Thomson Brooks/Cole.

2. Learning Outcomes Matrix (optional)

The relationship between Course Learning Outcomes (CLO) (1-4) and Intended Learning Outcomes (ILO) (1-10) of the EV program is shown in the following table:

CLOs		ILOs									
		Knowledge		Skills						Attitudes	
		1	2	3	4	5	6	7	8	9	10
Knowledge (Level: 1-6)	1	2									
	2	3		3							
Skill (Level: 1-7)	3	2									
Attitudes (Level: 1-5)	4							3			
Contribution of CLOs to ILOs											
Bloom's Taxonomy	AVE	2.3	0.0	3.0	0.0	0.0	0.0	3.0	0.0	0.0	0.0
L,M,H conversion *		L		M				M			

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
1-3	Chapter 1: Basis of Kinematics Motion in One Dimension: - Position, Velocity, and Acceleration - One-Dimensional Motion with Constant Acceleration - Freely Falling Objects Motion in Two Dimensions: - Position, Velocity, and Acceleration Vectors - Two-Dimensional Motion with Constant Acceleration. Projectile Motion - Circular Motion. Tangential and Radial Acceleration - Relative Velocity and Relative Acceleration	1	Assignment/Quiz Midterm	Lecture, Discussion, Inclass-Quiz	[1] 1 [2] 1, 2, 3, 4
4-7	Chapter 2: Laws of Motion - Newton's First Law and Inertial Frames - Newton's Second Law - Newton's Third Law Some Applications of Newton's Laws: - Gravitational Force and Weight	1	Assignment//Quiz Midterm	Lecture, Discussion, Inclass-Quiz	[1] 2 [2] 5, 6

Week	Topic	CLO	Assessments	Learning activities	Resources
	- Forces of Friction - Uniform Circular Motion and Non-uniform Circular Motion - Motion in the Presence of Resistive Forces - Motion in Accelerated Frames				
8	Chapter 3: Work and Mechanical Energy - Work Done by Force. Power - Kinetic Energy and Work. Kinetic Energy Theorem	3	Assignment//Quiz Final	Lecture, Discussion, Inclass-Quiz	[1] 3 [2] 7, 8
	Midterm				
9	- Potential Energy of a System - Conservation of Mechanical Energy - Conservative and Non-conservative Forces - Changes in Mechanical Energy for Non-conservative Forces - Relationship Between Conservative Forces and Potential Energy			Lecture, Discussion, Inclass-Quiz	
10-11	Chapter 4: Linear Momentum and Collisions - Linear Momentum and Its Conservation - Impulse and Momentum - Collisions in One Dimension and Two Dimensions		Assignment//Quiz Final	Lecture, Discussion, Inclass-Quiz	[1] 4 [2] 9
12-14	Chapter 5: Rotation of a Rigid Object About a Fixed Axis - Rotational Kinematics. Rotational Motion with Constant Angular Acceleration - Torque and Angular Acceleration - Moments of Inertia - Rotational Kinetic Energy - Rolling Motion of a Rigid Object - Angular Momentum of a Rotating Rigid Object - Conservation of Angular Momentum	3	Assignment//Quiz Final	Lecture, Discussion, Inclass-Quiz	[1] 5 [2] 10, 11
15	Chapter 6: Equilibrium and Elasticity The Conditions for Equilibrium The Center of Gravity Chapter 7: Universal Gravitation Newton's Law of Gravitation Kepler's Laws and the Motion of Planets The Gravitational Field and Gravitational and Potential Energy	3	Assignment//Quiz Final	Lecture, Discussion, Inclass-Quiz	[1] 6, 7 [2] 12, 13
	Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
In-class exercises/quizzes (10%)	Qz1 60%Pass	Qz2 60%Pass		Qz3 60%Pass

Assessment Type	CLO1	CLO2	CLO3	CLO4
Homework exercises (20%)	HW2 50%Pass		HW1, HW3, HW4 50%Pass	
Midterm exam (30%)		Q3 50%Pass	Q1, Q2 50%Pass	
Final exam (40%)	Part I 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:	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

	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 <i>Selecting and using information to investigate a point of view or conclusion</i>	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.

	Capstone	Milestone		Benchmark
	4	3	2	1
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

6. Date revised: August 14, 2023

Ho Chi Minh City, 14/8/2023



**VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY**
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Chemistry for Engineers

(Hóa học cho Kỹ sư)

Course Code: CH011IU

1. General information

Course designation	This one-semester course is designed for engineering students those who are pursuing a chemistry or non-chemistry engineering degree such as information technology, bio-technology, civil, biomedical, electronic and telecommunication engineering, environmental engineering, and chemical engineering. The course will introduce the basic principles of chemistry and connect those principles to issues in engineering professions.	
Teaching schedule	☒ Year 1 ☐ Year 2 ☐ Year 3 ☐ Year 4 ☐ Year 5 ☒ Semester 1 ☐ Semester 2 ☐ Summer	
Person In-Charge	Dr. Huynh Kim Lam, hklam@hcmiu.edu.vn Dr. Ngo Thi Thuan, ntthuan@hcmiu.edu.vn Dr. Phung Thanh Khoa, ptkhoa@hcmiu.edu.vn Dr. Vu Bao Khanh, ybkhanh@hcmiu.edu.vn	
Language	English	
Relation to curriculum	☒ General ☐ Fundamental ☐ Specialization ☐ Project/Internship/Thesis	☐ Compulsory ☐ Elective
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify:	

Workload			Lecture	Lab	Project	Internship	Thesis								
		<i>Credit</i>	3												
	Contact hours	37.5	37.5	0	0	0	0								
	Self-Study hours	90	90	0	0	0	0								
	Total workload	127.5	127.5	0	0	0	0								
Credit points	3														
Requirements for taking the course	☒ None ☐ Prerequisite course: <i>(Please specify course ID & course title, if any)</i> ☐ Parallel course: <i>(Please specify course ID & course title, if any)</i> ☐ Previous course: <i>(Please specify course ID & course title, if any)</i>														
Course objectives	The course objectives for chemistry for engineers aim to equip students with a strong conceptual understanding of chemical principles, analytical and problem-solving skills, and the ability to apply their knowledge to various chemical systems and phenomena.														
Course learning outcomes	Upon the successful completion of this course, students will be able to: <table border="1"> <thead> <tr> <th>Competency level¹</th> <th>Course learning outcome (CLO)</th> </tr> </thead> <tbody> <tr> <td>Knowledge</td> <td> CLO1. Demonstrate an understanding of the basic principles of chemistry, including atomic structure, chemical bonding, and the periodic table. [Apply] CLO2. Apply fundamental chemical concepts, such as stoichiometry, kinetics, and thermodynamics, to solve problems and make predictions about chemical reactions. [Apply] CLO3. Identify common chemical compounds, including organic and inorganic molecules, acids and bases, and salts. [Remember] CLO4. Analyze chemical reactions using principles of equilibrium, acid-base reactions, and oxidation-reduction reactions. [Analyze] CLO5. Apply chemistry knowledge to interdisciplinary fields, such as biochemistry, environmental science, materials science, and engineering. [Apply] </td> </tr> <tr> <td>Skill</td> <td></td> </tr> <tr> <td>Attitude</td> <td></td> </tr> </tbody> </table>							Competency level ¹	Course learning outcome (CLO)	Knowledge	CLO1. Demonstrate an understanding of the basic principles of chemistry, including atomic structure, chemical bonding, and the periodic table. [Apply] CLO2. Apply fundamental chemical concepts, such as stoichiometry, kinetics, and thermodynamics, to solve problems and make predictions about chemical reactions. [Apply] CLO3. Identify common chemical compounds, including organic and inorganic molecules, acids and bases, and salts. [Remember] CLO4. Analyze chemical reactions using principles of equilibrium, acid-base reactions, and oxidation-reduction reactions. [Analyze] CLO5. Apply chemistry knowledge to interdisciplinary fields, such as biochemistry, environmental science, materials science, and engineering. [Apply]	Skill		Attitude	
Competency level ¹	Course learning outcome (CLO)														
Knowledge	CLO1. Demonstrate an understanding of the basic principles of chemistry, including atomic structure, chemical bonding, and the periodic table. [Apply] CLO2. Apply fundamental chemical concepts, such as stoichiometry, kinetics, and thermodynamics, to solve problems and make predictions about chemical reactions. [Apply] CLO3. Identify common chemical compounds, including organic and inorganic molecules, acids and bases, and salts. [Remember] CLO4. Analyze chemical reactions using principles of equilibrium, acid-base reactions, and oxidation-reduction reactions. [Analyze] CLO5. Apply chemistry knowledge to interdisciplinary fields, such as biochemistry, environmental science, materials science, and engineering. [Apply]														
Skill															
Attitude															
Level of competence according to Bloom's Taxonomy:															
	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7								
Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x								
Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination								
Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x								

Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> <u>Weight</u>: lecture session (2.5 hours) <u>Teaching levels</u>: I (Introduce); T (Teach); U (Utilize) <table><tr><th>No.</th><th>Topic</th><th>Weight</th><th>Level</th></tr><tr><td>1</td><td>Chemistry and Measurement</td><td>1</td><td>I, T</td></tr><tr><td>2</td><td>Atoms, Molecules and Ions</td><td>2</td><td>T, U</td></tr><tr><td>3</td><td>Periodicity</td><td>1</td><td>T, U</td></tr><tr><td>4</td><td>Chemical Bonds</td><td>2</td><td>T</td></tr><tr><td>5</td><td>Intermolecular Forces</td><td>2</td><td>T, U</td></tr><tr><td>6</td><td>Gases and Their Properties</td><td>2</td><td>T</td></tr><tr><td>7</td><td>Solutions and Their Properties</td><td>1</td><td>T, U</td></tr><tr><td>8</td><td>Solids and Their Properties</td><td>1</td><td>T, U</td></tr><tr><td>9</td><td>Chemical Reactions</td><td>2</td><td>I, T</td></tr><tr><td>10</td><td>Chemical Kinetics</td><td>2</td><td>I, T</td></tr><tr><td>11</td><td>Chemical Equilibrium</td><td>1</td><td>T, U</td></tr><tr><td>12</td><td>Electrolytes, Acid- Base, pH and Buffer</td><td>1</td><td>I, T</td></tr><tr><td>13</td><td>Thermochemistry</td><td>2</td><td>I, T</td></tr><tr><td>14</td><td>Thermodynamics</td><td>2</td><td>I, T</td></tr></table>	No.	Topic	Weight	Level	1	Chemistry and Measurement	1	I, T	2	Atoms, Molecules and Ions	2	T, U	3	Periodicity	1	T, U	4	Chemical Bonds	2	T	5	Intermolecular Forces	2	T, U	6	Gases and Their Properties	2	T	7	Solutions and Their Properties	1	T, U	8	Solids and Their Properties	1	T, U	9	Chemical Reactions	2	I, T	10	Chemical Kinetics	2	I, T	11	Chemical Equilibrium	1	T, U	12	Electrolytes, Acid- Base, pH and Buffer	1	I, T	13	Thermochemistry	2	I, T	14	Thermodynamics	2	I, T
No.	Topic	Weight	Level																																																										
1	Chemistry and Measurement	1	I, T																																																										
2	Atoms, Molecules and Ions	2	T, U																																																										
3	Periodicity	1	T, U																																																										
4	Chemical Bonds	2	T																																																										
5	Intermolecular Forces	2	T, U																																																										
6	Gases and Their Properties	2	T																																																										
7	Solutions and Their Properties	1	T, U																																																										
8	Solids and Their Properties	1	T, U																																																										
9	Chemical Reactions	2	I, T																																																										
10	Chemical Kinetics	2	I, T																																																										
11	Chemical Equilibrium	1	T, U																																																										
12	Electrolytes, Acid- Base, pH and Buffer	1	I, T																																																										
13	Thermochemistry	2	I, T																																																										
14	Thermodynamics	2	I, T																																																										
Examination forms	☒ Multiple-choice questions ☐ Report ☐ Presentation ☐ Assignments ☐ Oral examination ☒ Written examination ☐ Others, please specify:																																																												
Other requirements	<u>Attendance</u>: 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. <u>Assignments/Examination</u>: Students must have more than 50/100 points overall to pass this course.																																																												
Reading list	I. Textbooks Mary Jane Shultz (2010). Chemistry for Engineers – An Applied Approach. Houghton Mifflin. Darrell Ebbing and Steven D. Gammon (2010). General Chemistry 9th Ed., Brooks/Cole, USA. Nivaldo J. Tro (2008). Chemistry: A Molecular Approach, 2nd Ed., Pearson. Masterton and Hurley (2009). Chemistry, Principles and Reactions, 6th Ed., Cengage learning, USA. II. References																																																												

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	3						
	2	3						
	3	1						
	4	4						
	5	3						
Skills (Level: 1-7)								
Attitudes (Level: 1-5)								
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	2.8	0.0	0.0	0.0	0.0	0.0	0.0
L,M,H conversion*		L						

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Chemistry and Measurement	1,5	HW	Lecture	
2.	2	Atoms, Molecules and Ions	1	HW	Lecture	
3.	3	Periodicity	1	HW	Lecture	
4.	4&5	Chemical Bonds	1	HW	Lecture	
5.	6	Intermolecular Forces	1	HW	Lecture	
6.	7	Gases and Their Properties	1	HW	Lecture	
7.	8	Solutions and Their Properties	1	HW	Lecture	
8.	9-10	Midterm				
9.	11	Solids and Their Properties	1,5	HW	Lecture	
10.	12	Chemical Reactions	1,4	HW	Lecture	
11.	13	Chemical Kinetics	2,5	HW	Lecture	
12.	14	Chemical Equilibrium	4	HW	Lecture	
13.	15	Electrolytes, Acid-Base, pH and Buffer	3,4,5	HW	Lecture	
14.	16	Thermochemistry	2,5	HW	Lecture	
15.	17	Thermodynamics	2,5	HW	Lecture	
16.	18	Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4	CLO5
Homework/Quiz (30%)	50%pass		50%pass		
Midterm exam (30%)	50%pass			50%pass	
Final exam (40%)		50%pass			

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

5. Rubrics (optional): No

6. Revision Date: May 20, 2023

	<i>Ho Chi Minh City, 20/5/2023</i> Dean of School of Chemical and Environmental Engineering  Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No .	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Chemistry Laboratory

(Thực hành hóa đại cương)

Course Code: CH012IU

1. General information

Course designation	The course will introduce students to basic laboratory safety, techniques, and apparatus, and complement the knowledge gained in the lecture. Prior to each lab, students must read the lab manual about the experiment and complete a pre-laboratory report. All students must complete mandatory safety training to participate in the course, which will be provided on the first day of the class. Students are expected to come to each lab on time and be prepared to carry out the day's tasks.	
Teaching schedule	☒ Year 1 ☐ Year 2 ☐ Year 3 ☐ Year 4 ☐ Year 5 ☐ Semester 1 ☒ Semester 2 ☐ Summer	
Person In-Charge	Dr. Phùng Thanh Khoa, ptkhoa@hcmiu.edu.vn	
Language	English	
Relation to curriculum	☐ General ☒ Fundamental ☐ Specialization ☐ Project/Internship/Thesis	☒ Compulsory ☐ Elective
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify: Practical experiment	

Workload			Lecture	Lab	Project	Internship	Thesis
		Credit		1			
	Contact hours	25	0	25	0	0	0
	Self-Study hours	30	0	30	0	0	0
	Total workload	55	0	55	0	0	0
Credit points	1						
Requirements for taking the course	☒ None ☐ Prerequisite course: (Please specify course ID & course title, if any) ☐ Parallel course: (Please specify course ID & course title, if any) ☐ Previous course: (Please specify course ID & course title, if any)						
Course objectives	To introduce students to general chemistry laboratory and to provide students with a firm foundation in chemistry laboratory for careers in science and engineering.						
Course learning outcomes	Upon the successful completion of this course, students will be able to:						
	Competency level ¹	Course learning outcome (CLO)					
	Knowledge	CLO1: Applying chemical concepts to draw logical conclusions about the applicability of data to real world problems [Applying].					
	Skill	CLO2. Being able to perform lab-work: perform experiment, analyze data, answer questions, make conclusion, research assignments, report writing [Set]. CLO3: Using collected data to calculate physical or chemical quantities to the experiment being performed [Guided Response].					

¹ Level of competence according to Bloom's Taxonomy:

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x
Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination
Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x

		CLO4: Developing teamwork skills that include not only the efficient acquisition of experimental data [Guided Response].																												
	Attitude	CLO5: An ability to recognize safety in the laboratory setting [Responding to Phenomena].																												
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> <u>Weight</u>: lecture session (4.2 hours) <u>Teaching levels</u>: I (Introduce); T (Teach); U (Utilize) <table><tr><th>No.</th><th>Topic</th><th>Weight</th><th>Level</th></tr><tr><td>1</td><td>Orientations</td><td>1</td><td>I, T, U</td></tr><tr><td>2</td><td>Chemical Reactions</td><td>1</td><td>I, T, U</td></tr><tr><td>3</td><td>pH and buffers</td><td>1</td><td>I, T, U</td></tr><tr><td>4</td><td>Redox titration</td><td>1</td><td>I, T, U</td></tr><tr><td>5</td><td>Chemical Equilibrium</td><td>1</td><td>I, T, U</td></tr><tr><td>6</td><td>Factors affecting reaction rate</td><td>1</td><td>I, T, U</td></tr></table>		No.	Topic	Weight	Level	1	Orientations	1	I, T, U	2	Chemical Reactions	1	I, T, U	3	pH and buffers	1	I, T, U	4	Redox titration	1	I, T, U	5	Chemical Equilibrium	1	I, T, U	6	Factors affecting reaction rate	1	I, T, U
No.	Topic	Weight	Level																											
1	Orientations	1	I, T, U																											
2	Chemical Reactions	1	I, T, U																											
3	pH and buffers	1	I, T, U																											
4	Redox titration	1	I, T, U																											
5	Chemical Equilibrium	1	I, T, U																											
6	Factors affecting reaction rate	1	I, T, U																											
Examination forms	☒ Multiple-choice questions ☐ Oral examination ☒ Report ☐ Written examination ☐ Presentation ☐ Others, please specify: ☐ Assignments																													
Other requirements	<u>Attendance</u>: 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. <u>Assignments/Examination</u>: Students must have more than 50/100 points overall to pass this course.																													
Reading list	I. Textbooks [1] Lab manual for chemistry laboratory (internal use only) II. References 																													

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-5) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	3						
	2							
	3							
Skills (Level: 1-7)	4				3			
	5					2	3	
	6							
Attitudes (Level: 1-5)	7							2
	8							
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	3.0	0.0	0.0	3.0	2.0	3.0	2.0
L,M,H conversion*		M			M	L	M	L

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Orientations	1,4		- Lecture	[1].
2.	2	Chemical Reactions	1,2,3,4	Group assignment, Lab report	- Lecture - Practice	[1].
3.	3	pH and buffers	1,2,3,4	Group assignment, Lab report	- Lecture - Practice	[1].
4.	4	Redox titration	1,2,3,4	Group assignment, Lab report	- Lecture - Practice	[1].
5.	5	Chemical Equilibrium	1,2,3,4	Group assignment, Lab report	- Lecture - Practice	[1].
6.	6	Factors affecting reaction rate	1,2,3,4	Group assignment, Lab report	- Lecture - Practice	[1].

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
7.	6	Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
In-class exercises/Pre-Lab (10%)	Pre-Lab 60%Pass	Pre-Lab 60%Pass	Pre-Lab 60%Pass	Pre-Lab 60%Pass
Lab report (60%)	Lab report 50%Pass	Lab report 50%Pass	Lab report 50%Pass	Lab report 50%Pass
Final exam (30%)	Part I 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): No

6. Revision Date: May 20, 2023

Ho Chi Minh City, 20/5/2023

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	An ability to identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	An ability to communicate (in English) effectively with a range of audiences
4	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: ENGINEERING DRAWING

(Vẽ kỹ thuật)

Course Code: ENEE1001IU

1. General information

Course designation	This subject aims at providing the ability to understand technical ideas on the technical scheme, the skill to construct the engineering drawing compliance with TCVN and ISO by hand and by using AutoCAD software. The course provides the knowledge for using geometrical construction with drawing instruments and AutoCAD software, the standard of presentation of engineering drawing; base, standard, constructing and the skill of analysis, understanding drawing representation. <i>Môn học này nhằm cung cấp khả năng hiểu các ý tưởng kỹ thuật về sơ đồ kỹ thuật, kỹ năng xây dựng bản vẽ kỹ thuật tuân thủ TCVN và ISO bằng tay và sử dụng phần mềm AutoCAD. Khóa học cung cấp kiến thức về việc sử dụng kỹ thuật hình học với các công cụ vẽ và phần mềm AutoCAD, tiêu chuẩn trình bày bản vẽ kỹ thuật; cơ sở, tiêu chuẩn, xây dựng và kỹ năng phân tích, hiểu biểu đồ vẽ.</i>		
Teaching schedule	☒ Year 1 ☐ Year 2 ☐ Year 3 ☐ Year 4 ☐ Year 5 ☒ Semester 1 ☐ Semester 2 ☐ Summer		
Person In-Charge	Dr. Pham Ngoc, pngoc@hcmiu.edu.vn Template: (Name in Vietnamese order), (Email)		
Language	English		
Relation to curriculum	☒ General ☐ Fundamental ☐ Specialization ☐ Project/Internship/Thesis	☒ Compulsory ☐ Elective	
	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar		

Teaching methods	Others, please specify:																																			
Workload	<table border="1"> <tr> <td></td><td></td><td>Lecture</td><td>Lab</td><td>Project</td><td>Internship</td><td>Thesis</td></tr> <tr> <td></td><td><i>Credit</i></td><td>2</td><td>1</td><td></td><td></td><td></td></tr> <tr> <td>Contact hours</td><td>50</td><td>25</td><td>25</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td>Self-Study hours</td><td>90</td><td>60</td><td>30</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td>Total workload</td><td>140</td><td>85</td><td>55</td><td>0</td><td>0</td><td>0</td></tr> </table>			Lecture	Lab	Project	Internship	Thesis		<i>Credit</i>	2	1				Contact hours	50	25	25	0	0	0	Self-Study hours	90	60	30	0	0	0	Total workload	140	85	55	0	0	0
		Lecture	Lab	Project	Internship	Thesis																														
	<i>Credit</i>	2	1																																	
Contact hours	50	25	25	0	0	0																														
Self-Study hours	90	60	30	0	0	0																														
Total workload	140	85	55	0	0	0																														
Credit points	3																																			
Requirements for taking the course	☒ None ☐ Prerequisite course: <i>(Please specify course ID & course title, if any)</i> ☐ Parallel course: <i>(Please specify course ID & course title, if any)</i> ☐ Previous course: <i>(Please specify course ID & course title, if any)</i>																																			
Course objectives	The aim of this course is to - Use drawing instruments to sketch by hand and to construct geometry on engineering drawings; - Apply the standard of engineering drawings instruments to present the drawing compliance with TCVN and ISO; - Present basic geometrical features and solve some basic problems for these features and specify the properties and relationship of geometrical features and the position and the true size of geometrical features; - Interpret the type of presentations compliance with TCVN and ISO, and orthographic projections, auxiliary views, partial views, and local views - Construct the engineering drawing to present some types of model and design the AutoCAD software to draw the drawing in compliance with TCVN and ISO and the 2D drawings.																																			
Course learning outcomes	Upon the successful completion of this course, students will be able to: <table border="1"> <tr> <th>Competency level</th><th>Course learning outcome (CLO)</th></tr> <tr> <td>Knowledge</td><td>CLO1. Understand drawing instruments to sketch by hand, and construct geometry on engineering drawings</td></tr> <tr> <td>Skill</td><td>CLO2. Apply the standard of engineering drawings and instruments to present the drawing compliance with TCVN and ISO, and apply knowledge of orthogonal projections method to present basic geometrical features and solve some basic problems for these features. CLO3. Apply basic drawing commands to construct the engineering drawing compliance with TCVN and ISO, and the 2D drawings by the AutoCAD software.</td></tr> </table>	Competency level	Course learning outcome (CLO)	Knowledge	CLO1. Understand drawing instruments to sketch by hand, and construct geometry on engineering drawings	Skill	CLO2. Apply the standard of engineering drawings and instruments to present the drawing compliance with TCVN and ISO, and apply knowledge of orthogonal projections method to present basic geometrical features and solve some basic problems for these features. CLO3. Apply basic drawing commands to construct the engineering drawing compliance with TCVN and ISO, and the 2D drawings by the AutoCAD software.																													
Competency level	Course learning outcome (CLO)																																			
Knowledge	CLO1. Understand drawing instruments to sketch by hand, and construct geometry on engineering drawings																																			
Skill	CLO2. Apply the standard of engineering drawings and instruments to present the drawing compliance with TCVN and ISO, and apply knowledge of orthogonal projections method to present basic geometrical features and solve some basic problems for these features. CLO3. Apply basic drawing commands to construct the engineering drawing compliance with TCVN and ISO, and the 2D drawings by the AutoCAD software.																																			

	Attitude	CLO4. Work independently and professionally																																													
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> <u>Weight</u>: lecture session (2.5 hours) <u>Teaching levels</u>: I (Introduce); T (Teach); U (Utilize) <table border="1"> <thead> <tr> <th>No.</th><th>Topic</th><th>Weight</th><th>Level</th></tr> </thead> <tbody> <tr> <td>1</td><td>Introduction to Engineering Drawing</td><td>1</td><td>I, T</td></tr> <tr> <td>2</td><td>Orthographic Projections</td><td>1</td><td>T, U</td></tr> <tr> <td>3</td><td>Pictorial Drawings</td><td>1</td><td>T, U</td></tr> <tr> <td>4</td><td>Dimensioning</td><td>1</td><td>T, U</td></tr> <tr> <td>5</td><td>Sectioning</td><td>1</td><td>T, U</td></tr> <tr> <td>6</td><td>Introduction and Install AutoCAD software Practice drawing commands</td><td>3</td><td>I, U</td></tr> <tr> <td>7</td><td>Practice modifying commands</td><td>2</td><td>T, U</td></tr> <tr> <td>8</td><td>Practice layer and printing management</td><td>1</td><td>T, U</td></tr> <tr> <td>9</td><td>Introduction to environmental drawings Conceptual drawings of a water treatment plant, air treatment plant, and solid waste treatment plant.</td><td>2</td><td>I, U</td></tr> <tr> <td>10</td><td>Practice an environmental drawings</td><td>2</td><td>T, U</td></tr> </tbody> </table>			No.	Topic	Weight	Level	1	Introduction to Engineering Drawing	1	I, T	2	Orthographic Projections	1	T, U	3	Pictorial Drawings	1	T, U	4	Dimensioning	1	T, U	5	Sectioning	1	T, U	6	Introduction and Install AutoCAD software Practice drawing commands	3	I, U	7	Practice modifying commands	2	T, U	8	Practice layer and printing management	1	T, U	9	Introduction to environmental drawings Conceptual drawings of a water treatment plant, air treatment plant, and solid waste treatment plant.	2	I, U	10	Practice an environmental drawings	2	T, U
No.	Topic	Weight	Level																																												
1	Introduction to Engineering Drawing	1	I, T																																												
2	Orthographic Projections	1	T, U																																												
3	Pictorial Drawings	1	T, U																																												
4	Dimensioning	1	T, U																																												
5	Sectioning	1	T, U																																												
6	Introduction and Install AutoCAD software Practice drawing commands	3	I, U																																												
7	Practice modifying commands	2	T, U																																												
8	Practice layer and printing management	1	T, U																																												
9	Introduction to environmental drawings Conceptual drawings of a water treatment plant, air treatment plant, and solid waste treatment plant.	2	I, U																																												
10	Practice an environmental drawings	2	T, U																																												
Examination forms	☐ Multiple-choice questions ☐ Oral examination ☐ Report ☐ Written examination ☐ Presentation ☒ Others, please specify: Constructed-response test, Practice on the Computer ☐ Assignments																																														
Other requirements	<u>Attendance</u>: 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. <u>Assignments/Examination</u>: Students must have more than 50/100 points overall to pass this course.																																														
Reading list	I. Textbooks [1] Kirstie Plantenberg (2010). Engineering Graphic Essentials, Fourth Edition, SDC Publications [2] Gary R Bertoline (2008). Introduction to Graphics Communication for Engineers, Fourth Edition, Mc Graw-Hill Higher Education. [3] Robert A. Corbitt (1999). Standard handbook of Environmental Engineering, Second Edition, The McGraw-Hill. II. References [4] Trần Hữu Quế (2009). Vẽ Kỹ Thuật Cơ Khí Tập 1, NXB Giáo Dục																																														

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	2	1					
Skills (Level: 1-7)	2			3	3			
	3			3	3	3	3	
Attitudes (Level: 1-5)	4							3
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	2.0	1.0	3.0	3.0	3.0	3.0	3.0
L,M,H conversion*		L	L	M	M	M	M	M

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Introduction to Engineering Drawing	1,2	Attendance Q&A Homework 1	Reading materials before class; Doing the lecture; Discussion;	[1] 1 [2] 1
2.	2	Orthographic Projections	1,2	Attendance Q&A In-class practice	Reading materials before class; Doing the lecture; Discussion; and doing Quiz in class,	[1] 2 [2] 2
3.	3	Pictorial Drawings	1,2	Attendance Q&A Homework 2	Reading materials before class; Doing the lecture; Discussion; and doing Quiz in class,	[1] 3 [2] 3
4.	4	Dimensioning	1,2	Attendance Q&A In-class practice	Reading materials before class; Doing the lecture; Discussion; and doing Quiz in class,	[1] 4 [2] 4
5.	5	Sectioning	1,2	Attendance Q&A Homework 3	Reading materials before class; Doing the lecture; Discussion; and doing Quiz in class,	[1] 5 [2] 5
6.	6	Introduction and Install AutoCAD software Practice drawing commands	3,4	Attendance Q&A Homework 4	Reading materials before class; Doing the lecture; Discussion;	[4] 1 [5] 1
7.	7-8	Practice drawing commands	3,4	Attendance Q&A In-class practice	Reading materials before class; Doing the lecture; Discussion; and doing Quiz in class	[4] 2 [5] 2
8.	9-10	Midterm examination		Writing		
9.	11	Practice drawing commands	3,4	Attendance Q&A Homework 5	Reading materials before class; Doing the lecture; Discussion; and doing Quiz in class	[4] 3 [5] 3
10	12	Practice dimensioning commands	3,4	Attendance Q&A Homework 6	Reading materials before class; Doing the lecture; Discussion; and doing Quiz in class	[4] 4 [5] 4
11	13	Practice layer and printing management	3,4	Attendance Q&A Homework 7	Reading materials before class; Doing the lecture; Discussion; and doing Quiz in class	[4] 5 [5] 5
12	14	Introduction to environmental drawings	3,4	Attendance Q&A In-class practice	Reading materials before class; Doing the lecture; Discussion; and doing Quiz in class	[3] 1 [4] 4 [5] 4

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
13	15	Conceptual drawings of a water treatment plant, air treatment plant, and solid waste treatment plant.	3,4	Attendance Q&A Homework 8	Reading materials before class; Doing the lecture; Discussion; and doing Quiz in class	[3] 2 [4] 4 [5] 4
14	16-17	Practice an environmental drawings	3,4	Attendance In-class practice	Reading materials before class; Doing the lecture; Discussion;	[3] 3 [4] 4 [5] 4
15	18	Practice an environmental drawings	3,4	Attendance In-class practice	Reading materials before class; Doing the presentation; Discussion;	[3] 3 [4] 4 [5] 4
16	19-20	Final examination		Practice on computer		

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
Progress assessment (PA, 20%)				
Class attendance (50% of PA)				Attended 80%Pass
In-class activity: Discussion and doing Quizzes in class (25% of PA)				Participated in class Q&A 60%Pass
Home works (25% of PA)				HW1-8, Submitted 80%Pass
Midterm exam (Mid, 30%)	Q1-2, 60%Pass	Q3-4 60%Pass		
Final exam (Fin, 50%)		Q1-2 60%Pass	Q3-5 60%Pass	

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

5. Rubrics (optional): No

6. Revision Date: May 20, 2023

Ho Chi Minh City, 20/5/2023

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Applied Statistics

(Thống kê ứng dụng)

Course Code: ENEE1019IU

1. General information

Course designation	This course is designed for students pursuing a degree in chemical/environmental engineering and provides knowledge on statistical data, plotting data, descriptive statistics, probability and distribution, hypothesis test, T-test, analysis of variance (ANOVA), time series analysis and forecasting.																																																
Semester(s) in which the course is taught	1,2																																																
Person responsible for the course	Dr. Tran Thanh Tu, ttu@hcmiu.edu.vn																																																
Language	English																																																
Relation to curriculum	☐ General ☒ Fundamental ☐ Specialization ☐ Project/Internship/Thesis				☒ Compulsory ☐ Elective																																												
Teaching methods	Lecture, lesson																																																
Workload	<table><tr><td></td><td></td><td>Lecture</td><td>Lab</td><td>Project</td><td>Internship</td><td>Thesis</td></tr><tr><td><i>Credit</i></td><td>2</td><td>2</td><td></td><td></td><td></td><td></td></tr><tr><td><i>ECTS</i></td><td>3.09</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>Contact hours</td><td>25</td><td>25</td><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>Self-Study hours</td><td>60</td><td>60</td><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>Total workload</td><td>85</td><td>85</td><td>0</td><td>0</td><td>0</td><td>0</td></tr></table>									Lecture	Lab	Project	Internship	Thesis	<i>Credit</i>	2	2					<i>ECTS</i>	3.09						Contact hours	25	25	0	0	0	0	Self-Study hours	60	60	0	0	0	0	Total workload	85	85	0	0	0	0
		Lecture	Lab	Project	Internship	Thesis																																											
<i>Credit</i>	2	2																																															
<i>ECTS</i>	3.09																																																
Contact hours	25	25	0	0	0	0																																											
Self-Study hours	60	60	0	0	0	0																																											
Total workload	85	85	0	0	0	0																																											
Credits/ECTS	2 credits/ 3.09 ECTS																																																
Requirements for taking the course	☐ None ☐ Prerequisite course ☒ Parallel course: ENEE1020IU Applied Statistics Lab ☒ Previous course: Introduction to Computing (ENEE2017IU)																																																

Course objectives	Students will be provided with the knowledge about statistical data, plotting data, descriptive statistics, probability and distribution, hypothesis test, T-test, analysis of variance (ANOVA), time series analysis and forecasting.			
Course learning outcomes	Upon the successful completion of this course students will be able to:			
	Competency level¹		Course learning outcome (CLO)	
	Knowledge		CLO1. Interpret the principles of data and statistics, plotting and smoothing data, descriptive statistics; discrete probability distributions, continuous probability distributions, sampling and sampling distributions in chemical/environmental statistical analyses. [2-Understanding] CLO2. Apply hypothesis testing and decision making, paired t-Test and independent t-Test, Analysis of Variance (ANOVA) as well as time series analysis and forecasting in chemical/environmental statistical analyses. [3-Applying]	
	Skill		CLO3. Proceed exercises related to data plotting and smoothing, descriptive statistics, probability distributions in chemical/environmental statistical analyses. [2-Set] CLO4. Show the difference of hypothesis tests, the importance of ANOVA, time series analysis and forecasting in chemical/environmental statistical analyses. [2-Set]	
	Attitude		CLO5. Follow the ethical guidelines in chemical/environmental statistical practices. [3-Valuing]	
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i>			
	Weight: lecture session (2.5 hours)			
	Teaching levels: I (Introduce); T (Teach); U (Utilize)			
	No.	Topic	Weight	Level
	1.	Introduction to Data and Statistics	1	T,U
2.	Plotting and Smoothing data	1	T,U	
3.	Descriptive statistics	1	T,U	

¹Level of competence according to Bloom's Taxonomy:

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x
Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination
Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x

	4.	Probability and Distribution	1	I,T
	5.	Hypothesis tests	1	I,T
	6.	t-Tests	1	I,T
	7.	Analysis of Variance (ANOVA)	2	I,T
	8.	Time series analysis and forecasting	2	I,T
Examination forms	☒ Multiple-choice questions ☐ Report ☐ Presentation ☒ Assignments		☐ Oral examination ☒ Written examination ☐ Others, please specify	
Other requirements	Attendance: A minimum attendance of 80 percent is compulsory for the theory session and 100 percent is compulsory for the labwork session. Students will be assessed based on 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 Mac Berthouex. Linfield C. Brown, <i>Statistics for Environmental Engineers, 2nd Edition</i> . Lewis Publishers, 2002. [2] Nathabandu T. Kottegoda and Renzo Rosso, <i>Applied Statistics for Civil and Environmental Engineers, 2nd Edition</i> . Blackwell publishing, 2008. [3] Yuri A.W.Shardt, <i>Statistics for Chemical and Process Engineers: A Modern Approach</i> , Springer, 2015. [4] David R. Anderson, Dennis J. Sweeney, Thomas A. Williams, Jeffrey D. Camm, James J. Cochran, <i>Statistics for Business & Economics, 13th Edition</i> . Cengage Learning, USA, 2017.			

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-5) and Intended Learning Outcomes (ILO) is shown in the following table:

CLOs		ILOs								
		Knowledge		Skills						Attitudes
		1	2	3	4	5	6	7	8	9
Knowledge (Level: 1-6)	1	2								
	2	3								
Skill (Level: 1-7)	3			2						
	4				2					
Attitudes (Level: 1-5)	5									3
Contribution of CLOs to ILOs										
Bloom's Taxonomy	AVE	2.5	0.0	2.0	2.0	0.0	0.0	0.0	0.0	3.0
L,M,H conversion *		L		L	L					M

* L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Introduction to Data and Statistics	1,5	Quiz1	Lecture, Discussion, Quiz	[1] Chapter 1,2 [4] Chapter 1
2.	2	Plotting and Smoothing data	1,3	HW1	Lecture, Discussion, Homework	[1] Chapter 3,4 [3] Chapter 1 [4] Chapter 2
3.	3	Descriptive statistics	1,3		Lecture, Discussion	[1] Chapter 5,6 [3] Chapter 1 [4] Chapter 3
4.	4	Probability and Distribution	1,3	HW2	Lecture, Discussion, Homework	[2] Chapter 2,3,4 [4] Chapter 4,5,6
5.	5	Hypothesis tests	2,4	Quiz2	Lecture, Discussion, Quiz	[1] Chapter 16 [2] Chapter 5 [3] Chapter 2 [4] Chapter 9
6.	6	t-Tests	2,4	HW3	Lecture, Discussion, Homework	[1] Chapter 17,18 [4] Chapter 9
7.	7	Analysis of Variance (ANOVA) (part 1)	2,4		Lecture, Discussion	[1] Chapter 24 [2] Chapter 6 [4] Chapter 13
8.	8	Analysis of Variance (ANOVA) (part 2)	2,4	HW3	Lecture, Discussion, Homework	[1] Chapter 25 [4] Chapter 13
9.	9	Midterm		A1		
10.	9	Time series analysis and forecasting (part 1)	2,4		Lecture, Discussion	[1] Chapter 53 [3] Chapter 5 [4] Chapter 17
11.	10	Time series analysis and forecasting (part 2)	2,4	HW4	Lecture, Discussion, Homework	[1] Chapter 53 [3] Chapter 5 [4] Chapter 17
		No class				
		Reserved week				
12.	17	Final exam		A2		

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4	CLO5
In-class Quiz and homework (HW) (30%)	HW1 Quiz1 60%Pass (R5.1)	HW3 Quiz2 60%Pass (R5.1)	HW2 60%Pass (R5.1)	HW4 60%Pass (R5.1)	Quiz1 60%Pass (R5.1)
Midterm exam (A1) (30%)	A1. Part I 60%Pass (R5.2)		A1. Part II 60%Pass (R5.2)		
Final exam (A2) (40%)		A2. Part I 60%Pass (R5.2)		A2. Part II 60%Pass (R5.2)	

Note: %Pass: Target that 60% of students having scores greater than 50 out of 100.

5. Rubrics

5.1 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.

5.2 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	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts

	Capstone	Milestone		Benchmark
	4	3	2	1
			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

6. Date revised: August 14, 2023

Ho Chi Minh City, 14/8/2023

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Intended Learning Outcomes
	<i>Knowledge and understanding</i>
1	Apply the knowledge of mathematics, sciences, and engineering to solve environmental engineering problems
2	Apply a broad knowledge to consider the impact of environmental engineering solutions in a global, economic, and social context
	<i>Skills</i>
3	Identify, formulate, and solve environmental engineering problems systematically
4	Design and conduct classical and modern experimentations, as well as analyze and interpret data
5	Design environmental systems, components, or processes to meet desired needs within realistic constraints such as economic, environment, occupational health, and safety
6	Apply the techniques, skills, and modern technical tools necessary for technical practice in environmental engineering
7	Display the ability to communicate effectively in English, writing reports, and presenting professional topics.
8	Work effectively on multidisciplinary teams to accomplish a common goal
	<i>Autonomy and responsibility</i>
9	Demonstrate professional and ethical responsibilities in the practice of environmental engineering
10	Recognize the need and continue the professional development and lifelong learning.

For administrative purposes

RECORD OF REVISIONS

No.	Session/Page	Content of revision	Date of revision	Revised by
1	General Information	Reduce the credit of course to 2 (theory only) due to the separating of Lab works to a new course	May 26th, 2023	Dr. Tran Thanh Tu
2	General Information	Add Parallel course: ENEE1020IU Applied Statistics Lab		
3	Assessment plan	Revise assessment plan according to the changes in CLOs.		
4	Rubrics	Add rubric for presentation assessment		
5	Course learning outcomes	Add detail of Bloom taxonomy	June 13th, 2023	Dr. Tran Thanh Tu
6	Learning Outcomes Matrix	Change Learning Outcomes Matrix		
7	Rubrics	Change rubrics		



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Applied Statistics Lab

(Thực hành Thống kê ứng dụng)

Course Code: ENEE1020IU

1. General information

Course designation	This course is designed for students pursuing a degree in chemical/environmental engineering and provides knowledge and skills in using Python/R software for plotting data, descriptive statistics, hypothesis test, T-test, analysis of variance (ANOVA), time series analysis and forecasting.																																																
Semester(s) in which the course is taught	1,2																																																
Person responsible for the course	Dr. Tran Thanh Tu, ttu@hcmiu.edu.vn																																																
Language	English																																																
Relation to curriculum	☐ General ☒ Fundamental ☐ Specialization ☐ Project/Internship/Thesis				☒ Compulsory ☐ Elective																																												
Teaching methods	Lecture, lesson, lab works																																																
Workload	<table><tr><td></td><td></td><td>Lecture</td><td>Lab</td><td>Project</td><td>Internship</td><td>Thesis</td></tr><tr><td><i>Credit</i></td><td>1</td><td>0</td><td>1</td><td></td><td></td><td></td></tr><tr><td><i>ECTS</i></td><td>2.00</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>Contact hours</td><td>25</td><td>0</td><td>25</td><td>0</td><td>0</td><td>0</td></tr><tr><td>Self-Study hours</td><td>30</td><td>0</td><td>30</td><td>0</td><td>0</td><td>0</td></tr><tr><td>Total workload</td><td>55</td><td>0</td><td>55</td><td>0</td><td>0</td><td>0</td></tr></table>									Lecture	Lab	Project	Internship	Thesis	<i>Credit</i>	1	0	1				<i>ECTS</i>	2.00						Contact hours	25	0	25	0	0	0	Self-Study hours	30	0	30	0	0	0	Total workload	55	0	55	0	0	0
		Lecture	Lab	Project	Internship	Thesis																																											
<i>Credit</i>	1	0	1																																														
<i>ECTS</i>	2.00																																																
Contact hours	25	0	25	0	0	0																																											
Self-Study hours	30	0	30	0	0	0																																											
Total workload	55	0	55	0	0	0																																											
Credits/ECTS	1 credits/ 2.00 ECTS																																																
Required and recommended prerequisites for joining the course	☐ None ☐ Prerequisite course ☒ Parallel course: ENEE1019IU Applied Statistics ☒ Previous course: Introduction to Computing (ENEE2017IU)																																																

Course objectives	Students will be provided with the knowledge and skills about using Python/R software to analyze chemical/environmental statistical data, plotting data, test hypothesis, conduct analysis of variance (ANOVA), time series analysis and forecasting.			
Course learning outcomes	Upon the successful completion of this course students will be able to:			
	Competency level ¹	Course learning outcome (CLO)		
	Knowledge	CLO1. Explain the application of Python/R software in plotting, smoothing, analyzing chemical/environmental data. [2-Understanding] CLO2. Use Python/R software in chemical/environmental hypothesis tests and time series data analysis. [3-Applying]		
	Skill	CLO3. Display codes in Python/R to plot, smooth data and show descriptive statistics of chemical/environmental data. [2-Set] CLO4. Proceed programming in Python/R for chemical/environmental hypothesis tests and time series data analysis. [2-Set]		
	Attitude	CLO5. Follow the ethical integrity in Python/R programming. [3-Valuing]		
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i>			
	Weight: lecture session (4.17 hours)			
	Teaching levels: I (Introduce); T (Teach); U (Utilize)			
	No.	Topic	Weight	Level
	1.	Data with Python/R	1	I, T
	2.	Graphics with Python/R	1	I, T
	3.	Statistical analyses with Python/R (part 1)	1	I, T
4.	Statistical analyses with Python/R (part 2)	1	T, U	
5.	Programming with Python/R in practice (Hypothesis tests)	1	T, U	

¹Level of competence according to Bloom's Taxonomy:

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x
Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination
Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x

	6.	Programming with Python/R in practice (Regression models)	1	T, U
Examination forms	☒ Multiple-choice questions ☐ Report ☐ Presentation ☒ Assignments		☐ Oral examination ☐ Written examination ☒ Others, please specify: Lab work (coding)	
Other requirements	Attendance: A minimum attendance of 80 percent is compulsory for the theory session and 100 percent is compulsory for the labwork session. Students will be assessed based on 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] Yosef Cohen and Jeremiah Y. Cohen, <i>Statistics and data with R - An applied approach through examples</i>. John Wiley & Sons, 2008. [2] C. Reimann, P. Filzmoser, R. G. Garrett, R. Dutter, <i>Statistical Data Analysis Explained: Applied Environmental Statistics with R</i>. John Wiley & Sons, 2008. [3] Thomas Haslwanter, <i>An Introduction to Statistics with Python with Applications in the Life Sciences</i>, Springer, 2016. Software: [1] The R Foundation for Statistical Computing (2019), <i>R</i> 3.5.3. (https://cran.r-project.org/) [2] https://www.python.org/			

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-5) and Intended Learning Outcomes (ILO) is shown in the following table:

CLOs		ILOs									
		Knowledge		Skills						Attitudes	
		1	2	3	4	5	6	7	8	9	10
Knowledge (Level: 1-6)	1	2									
	2	3									
Skill (Level: 1-7)	3			2							
	4				2						
Attitudes (Level: 1-5)	5									3	
Contribution of CLOs to ILOs											
Bloom's Taxonomy	AVE	2.5	0.0	2.0	2.0	0.0	0.0	0.0	0.0	3.0	0.0
L,M,H conversion *		L		L	L					M	

* L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	11	Data with Python/R	1,3		Discussion, Coding	[1] Chapter 1,2 [2] Chapter 2 [3] Chapter 3
2.	12	Graphics with Python/R	1,3	Quiz1	Discussion, Coding, Quiz	[1] Chapter 3 [2] Chapter 3 [3] Chapter 4
3.	13	Statistical analyses with Python/R (part 1)	1,3	CE1	Discussion, Coding, Quiz	[1] Chapter 4,5,6 [2] Chapter 4 [3] Chapter 6
4.	14	Statistical analyses with Python/R (part 2)	2,4	Quiz2	Discussion, Coding, Quiz	[1] Chapter 10 [2] Chapter 9 [3] Chapter 7
5.	15	Programming with Python/R in practice (Hypothesis tests)	2,4		Discussion, Coding	[1] Chapter 14,15 [2] Chapter 16 [3] Chapter 11
6.	16	Programming with Python/R in practice (Regression models)	2,4,5	CE2	Discussion, Coding	CE1,2
7.	17	Final exam		A		

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4	CLO5
In-class Quiz (20%)	Quiz1 (R5.1) 60%Pass	Quiz2 (R5.1) 60%Pass	Quiz1 (R5.1) 60%Pass	Quiz2 (R5.1) 60%Pass	
Coding exercise (CE) (40%)	CE1 (R5.2) 60%Pass	CE2 (R5.2) 60%Pass	CE1 (R5.2) 60%Pass	CE2 (R5.2) 60%Pass	CE2 (R5.2) 60%Pass
Final exam (A) (40%)		A (R5.3) 60%Pass			A (R5.3) 60%Pass

Note: %Pass: Target that 60% of students having scores greater than 50 out of 100.

5. Rubrics

5.1. 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.

5.2. Rubric for lab work assessment

Criteria	% contribute	Level					
		Excellent	Very good	Good	Fair	Average	Weak
		90≤ ≤100	80≤ <90	70≤ <80	60≤ <70	50≤ <60	<50
1. Attendance	10	Participate (100)					Be late ≥15 min
2. Preparation for the lab	5	Prepare well, answer all questions correctly					Not prepare well, could not answer correctly 50% questions
3. Follow the guide, be active	5	Strictly follow, active					Not follow, inactive
4. Coding skills during the classes (arrange the data, correct commands, fix bugs, etc.)	70	Correct in procedures for data input, write command, fix bugs					Incorrect in procedures for data input, write command, fix bugs
5. Code submission (after the classes)	10	On time					No submission
Total	100						

5.3. 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

	Capstone	Milestone		Benchmark
	4	3	2	1
				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

6. Date revised: August 14, 2023

Ho Chi Minh City, 14/8/2023

Dean of School of Chemical and Environmental Engineering

Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Intended Learning Outcomes
	<i>Knowledge and understanding</i>
1	Apply the knowledge of mathematics, sciences, and engineering to solve environmental engineering problems
2	Apply a broad knowledge to consider the impact of environmental engineering solutions in a global, economic, and social context
	<i>Skills</i>
3	Identify, formulate, and solve environmental engineering problems systematically
4	Design and conduct classical and modern experimentations, as well as analyze and interpret data
5	Design environmental systems, components, or processes to meet desired needs within realistic constraints such as economic, environment, occupational health, and safety
6	Apply the techniques, skills, and modern technical tools necessary for technical practice in environmental engineering
7	Display the ability to communicate effectively in English, writing reports, and presenting professional topics.
8	Work effectively on multidisciplinary teams to accomplish a common goal
	<i>Autonomy and responsibility</i>
9	Demonstrate professional and ethical responsibilities in the practice of environmental engineering
10	Recognize the need and continue the professional development and lifelong learning.

For administrative purposes

RECORD OF REVISIONS

No.	Session/Page	Content of revision	Date of revision	Revised by
1	All	Create new course (due to the separating of Lab works from course: ENEE1019IU Applied Statistics)	May 26th, 2023	Dr. Tran Thanh Tu
2	Course learning outcomes	Add detail of Bloom taxonomy	June 13th, 2023	Dr. Tran Thanh Tu
3	Learning Outcomes Matrix	Change Learning Outcomes Matrix		
4	Rubrics	Change rubrics		



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Applied Mechanics

(Cơ học Ứng dụng)

Course Code: CHE0011IU

1. General information

Course designation	This subject presents the fundamental knowledge of equilibrium conditions of force system and the knowledge and skills of methods of calculation of strength of materials problems: Tension and Compression, Torsion, Plane Bending, Combined Bending and Torsion; and the knowledge of transmissions of belt, chain, gear, shaft and driveshaft (bearings) in engineering.																																								
Teaching schedule	☐ Year 1 ☒ Year 2 ☐ Year 3 ☐ Year 4 ☐ Year 5 ☒ Semester 1 ☐ Semester 2 ☐ Summer																																								
Person In-Charge																																									
Language	English																																								
Relation to curriculum	☒ General ☐ Fundamental ☐ Specialization ☐ Project/Internship/Thesis			☐ Compulsory ☐ Elective																																					
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify:																																								
Workload	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th><th></th><th>Lecture</th><th>Lab</th><th>Project</th><th>Internship</th><th>Thesis</th></tr> </thead> <tbody> <tr> <td></td><td><i>Credit</i></td><td>3</td><td></td><td></td><td></td><td></td></tr> <tr> <td>Contact hours</td><td>37.5</td><td>37.5</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td>Self-Study hours</td><td>90</td><td>90</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td>Total workload</td><td>127.5</td><td>127.5</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> </tbody> </table>								Lecture	Lab	Project	Internship	Thesis		<i>Credit</i>	3					Contact hours	37.5	37.5	0	0	0	0	Self-Study hours	90	90	0	0	0	0	Total workload	127.5	127.5	0	0	0	0
		Lecture	Lab	Project	Internship	Thesis																																			
	<i>Credit</i>	3																																							
Contact hours	37.5	37.5	0	0	0	0																																			
Self-Study hours	90	90	0	0	0	0																																			
Total workload	127.5	127.5	0	0	0	0																																			

Credit points	3									
Requirements for taking the course	☐ None ☐ Prerequisite course: ☐ Parallel course: <i>(Please specify course ID & course title, if any)</i> ☒ Previous course: CALCULUS 1 (MA001IU), PHYSICS 1 (PH013IU)									
Course objectives	Provide to student knowledge of basic mechanic principles of rigid solid mechanics and deformation solid mechanics is based on the understanding of a few basic concepts and on the use of simplified models. This approach makes it possible to develop all the necessary formulas in a rational and logical manner, and to clearly indicate the conditions under which they can be safely applied to the analysis and design of actual engineering structured and machine components.									
Course learning outcomes	Upon the successful completion of this course, students will be able to: <table border="1" style="width: 100%;"> <thead> <tr> <th style="width: 15%;">Competency level¹</th><th>Course learning outcome (CLO)</th></tr> </thead> <tbody> <tr> <td>Knowledge</td><td> CLO1. Model static mechanic system. Analyze and evaluate the force on the force system. [Analyze, evaluate] CLO2. Master the fundamental theorem of statics. Apply the equilibrium conditions of the force system to determine the reactions. [Understanding] CLO3. Apply the equilibrium conditions of force system to determine the internal force and to draw the internal force diagram of bars. [Apply] CLO4. Analyze stress and strain of element and apply the strength theories to calculate the strength of an element. [Analyze] CLO5. Calculate and select the belts, chains, gears, shafts and bearings according to design criteria. [Apply] CLO6. Realize 'work-ready engineer' and benefits of the designed calculation. [Understanding] </td></tr> <tr> <td>Skill</td><td>CLO7. Use the strength theories to design reasonable cross section of bars (bars, truss and mechanical parts...) in different load types. [Mechanism]</td></tr> <tr> <td>Attitude</td><td></td></tr> </tbody> </table>		Competency level ¹	Course learning outcome (CLO)	Knowledge	CLO1. Model static mechanic system. Analyze and evaluate the force on the force system. [Analyze, evaluate] CLO2. Master the fundamental theorem of statics. Apply the equilibrium conditions of the force system to determine the reactions. [Understanding] CLO3. Apply the equilibrium conditions of force system to determine the internal force and to draw the internal force diagram of bars. [Apply] CLO4. Analyze stress and strain of element and apply the strength theories to calculate the strength of an element. [Analyze] CLO5. Calculate and select the belts, chains, gears, shafts and bearings according to design criteria. [Apply] CLO6. Realize 'work-ready engineer' and benefits of the designed calculation. [Understanding]	Skill	CLO7. Use the strength theories to design reasonable cross section of bars (bars, truss and mechanical parts...) in different load types. [Mechanism]	Attitude	
Competency level ¹	Course learning outcome (CLO)									
Knowledge	CLO1. Model static mechanic system. Analyze and evaluate the force on the force system. [Analyze, evaluate] CLO2. Master the fundamental theorem of statics. Apply the equilibrium conditions of the force system to determine the reactions. [Understanding] CLO3. Apply the equilibrium conditions of force system to determine the internal force and to draw the internal force diagram of bars. [Apply] CLO4. Analyze stress and strain of element and apply the strength theories to calculate the strength of an element. [Analyze] CLO5. Calculate and select the belts, chains, gears, shafts and bearings according to design criteria. [Apply] CLO6. Realize 'work-ready engineer' and benefits of the designed calculation. [Understanding]									
Skill	CLO7. Use the strength theories to design reasonable cross section of bars (bars, truss and mechanical parts...) in different load types. [Mechanism]									
Attitude										

¹ Level of competence according to Bloom's Taxonomy:

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x
Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination
Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x

Content

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

Weight: lecture session (2.5 hours)

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

No.	Topic	Weight	Level
1	Fundamental notions and principles in theoretical mechanics	1	I, T
2	Reduction of a system of force. Conditions of a system of balanced forces.	2	T, U
3	Fundamental notions of mechanics of elastic strain	1	T, U
4	Stress and strain	2	T
5	Strain on bar material	2	T, U
6	Belt actuators	2	T
7	Chain actuators	1	T, U
8	Gear actuators	1	T, U
9	Shafts – Bearings - Clutches	0.5	I, T

Examination forms

☐ Multiple-choice questions	☐ Oral examination
☐ Report	☒ Written examination
☐ Presentation	☐ Others, please specify:
☐ Assignments	

Other requirements	<u>Attendance:</u> 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. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.
Reading list	I. Textbooks Đỗ Sanh, Cơ học kỹ thuật Tập 1, NXB Giáo dục Việt Nam, 2009. Ngô Kiều Nhi, Trương Tích Thiện, Cơ ứng dụng, NXB ĐHQG Tp. HCM. 2005. Ferdinand P. Beer, Mechanics of Materials, McGraw-Hill, 2012. II. References Nguyễn Hữu Lộc, Thiết kế chi tiết máy, NXB ĐHQG Tp. HCM, 2009. J. L. Meriam, L. G. Kraige, Engineering Mechanics – Statics & Dynamics, John Wiley & Sons, Inc., 2002. Ferdinand P. Beer, Mechanics of Materials, McGraw-Hill, 2012.

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-7) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	4						
	2	1						
	3	3						
	4	4						
	5	3						
	6	1						
Skills (Level: 1-7)	7				4			
Attitudes (Level: 1-5)								
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	2.7	0.0	0.0	4.0	0.0	0.0	0.0
L,M,H conversion*		L			H			

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1&2	Fundamental notions and principles in theoretical mechanics	1,2,3	HW	Lecture	
2.	3&4	Reduction of a system of force. Conditions of a system of balanced forces.	1,2,3	HW	Lecture	
3.	5&6	Fundamental notions of mechanics of elastic strain	1,2,3	HW	Lecture	
4.	7&8	Stress and strain	1,2,3	HW	Lecture	
5.	9-10	Midterm				
6.	11&12	Strain on bar material	1,2,3	HW	Lecture	
7.	13&14	Belt actuators	1,2,3	HW	Lecture	
8.	15	Chain actuators	1,2,3	HW	Lecture	
9.	16	Gear actuators	1,2,3	HW	Lecture	
10.	17	Shafts – Bearings - Clutches	1,2,3	HW	Lecture	
11.	18	Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4	CLO5	CLO6	CLO7
In-class attendance (10%)							
Homework exercises (20%)	>50% pass				>50% pass		
Midterm exam (30%)			>50% pass				
Final exam (40%)	>50% pass				>50% pass		

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

5. Rubrics (optional): No

6. Revision Date: May 20, 2023

Ho Chi Minh City, 20/5/2023

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Fluid Mechanics

(Cơ học lưu chất)

Course Code: CE205IU

1. General information

Course designation	Fluid mechanics is one of the principal subject for engineers. Generally, fluid mechanics is the study of the mechanisms in which fluids, under all possible conditions (such as: gases and liquids) respond to forces, exert forces, and move from one place to another in physical view. This course will provide fundamental knowledge on physical properties of fluids and its characteristics as well. Moreover, students learn the laws and the governing equations representing different kinds of fluids at both static and motion state interacting to structures; and know how to solve these equations or compute physical parameters in practical meaning. In addition, the practices to measure fluid properties are introduced in this course. Therefore, fluid mechanics is involved in nearly all areas of chemical and environmental engineering either directly or indirectly. Some examples of direct involvement are those where we are concerned with manipulating the fluid, including: sea and river hydrodynamic, hydraulic of water distribution/sewerage (sanitation) networks or irrigation system and so on; and some examples where the primary object is construction - yet analysis of the fluid mechanics is essential, such as: flow of air in / around buildings; bridge piers in rivers; flood defense structures, dams and so forth.				
Teaching schedule	☒ Year 1	☐ Year 2	☐ Year 3	☐ Year 4	☐ Year 5
	☐ Semester 1		☒ Semester 2		☐ Summer
Person In-Charge	A/Prof. Phạm Ngọc, pngoc@hcmiu.edu.vn				
Language	English				

Relation to curriculum	☐ General ☒ Fundamental ☐ Specialization ☐ Project/Internship/Thesis		☒ Compulsory ☐ Elective																																				
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify:																																						
Workload	<table border="1"> <tr> <td></td> <td></td> <td>Lecture</td> <td>Lab</td> <td>Project</td> <td>Internship</td> <td>Thesis</td> </tr> <tr> <td></td> <td><i>Credit</i></td> <td>2</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Contact hours</td> <td>30</td> <td>30</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>Self-Study hours</td> <td>60</td> <td>60</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>Total workload</td> <td>90</td> <td>90</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> </tr> </table>						Lecture	Lab	Project	Internship	Thesis		<i>Credit</i>	2					Contact hours	30	30	0	0	0	0	Self-Study hours	60	60	0	0	0	0	Total workload	90	90	0	0	0	0
		Lecture	Lab	Project	Internship	Thesis																																	
	<i>Credit</i>	2																																					
Contact hours	30	30	0	0	0	0																																	
Self-Study hours	60	60	0	0	0	0																																	
Total workload	90	90	0	0	0	0																																	
Credit points	2																																						
Requirements for taking the course	☐ None ☒ Prerequisite course: <i>Calculus 1 (MA001IU), Physics 1 – Mechanics (PH013IU)</i> ☒ Parallel course: <i>Fluid Mechanics Lab (CE206IU)</i> ☐ Previous course: <i>(Please specify course ID & course title, if any)</i>																																						
Course objectives	- Introduce the concepts of fluid mechanics, which are more applicable for civil engineers; - Demonstrate how these concepts are used for solving some common problems in field of civil engineering																																						
Course learning outcomes	Upon the successful completion of this course, students will be able to: <table border="1" style="width: 100%;"> <tr> <th style="width: 15%;">Competency level¹</th> <th colspan="3">Course learning outcome (CLO)</th> </tr> <tr> <td> </td> <td colspan="3"> </td> </tr> </table>				Competency level ¹	Course learning outcome (CLO)																																	
Competency level ¹	Course learning outcome (CLO)																																						

¹ Level of competence according to Bloom's Taxonomy:

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x
Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination
Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x

	Knowledge	CLO1. Calculate fundamental parameters of fluids [Applying] CLO2. Apply the principles of fluid static to analyze and estimate the hydrostatic pressure and force exerted on submerged surfaces or floating subjects [Applying]. CLO3. Apply the fundamental of fluid dynamic to solve some problems in field of civil engineering [Applying]																																						
	Skill	CLO4. Think and work independently and professionally, solve problems [Valuing]																																						
	Attitude																																							
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> <u>Weight</u>: lecture session (1.67 hours) <u>Teaching levels</u>: I (Introduce); T (Teach); U (Utilize) <table><tr><th>No.</th><th>Topic</th><th>Weight</th><th>Level</th></tr><tr><td>1</td><td>Introduction</td><td>1</td><td>I, T, U</td></tr><tr><td>2</td><td>Fluid Static</td><td>4</td><td>I, T, U</td></tr><tr><td>3</td><td>The flow of an ideal fluids</td><td>2</td><td>I, T, U</td></tr><tr><td>4</td><td>The flow of a real fluids</td><td>1</td><td>I, T, U</td></tr><tr><td>5</td><td>The flow in pipes</td><td>2</td><td>I, T, U</td></tr><tr><td>6</td><td>Fluid measurement</td><td>1</td><td>I, T</td></tr><tr><td>7</td><td>Flow about immersed objects</td><td>2</td><td>I, T, U</td></tr><tr><td>8</td><td>Group assignment</td><td>1</td><td>I, U</td></tr></table>				No.	Topic	Weight	Level	1	Introduction	1	I, T, U	2	Fluid Static	4	I, T, U	3	The flow of an ideal fluids	2	I, T, U	4	The flow of a real fluids	1	I, T, U	5	The flow in pipes	2	I, T, U	6	Fluid measurement	1	I, T	7	Flow about immersed objects	2	I, T, U	8	Group assignment	1	I, U
No.	Topic	Weight	Level																																					
1	Introduction	1	I, T, U																																					
2	Fluid Static	4	I, T, U																																					
3	The flow of an ideal fluids	2	I, T, U																																					
4	The flow of a real fluids	1	I, T, U																																					
5	The flow in pipes	2	I, T, U																																					
6	Fluid measurement	1	I, T																																					
7	Flow about immersed objects	2	I, T, U																																					
8	Group assignment	1	I, U																																					
Examination forms	☐ Multiple-choice questions ☐ Report ☐ Presentation ☐ Assignments ☐ Oral examination ☒ Written examination ☐ Others, please specify:																																							

Other requirements	<u>Attendance:</u> 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. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.
Reading list	I. Textbooks [1] Bruce R. Munson, Donald F. Young, Theodore H. Okiishi, <i>Fundamentals of fluid mechanics</i>, John Wiley & Sons Inc. 2006. [2]. Donald F. Elger, Barbara C. Williams, Clayton T. Crowe, John A. Roberson. <i>Engineering of Fluid Mechanics</i> (10 Edition). Wiley. 2014 II. References [3] Bar Meir, Genick, <i>Basic of fluid mechanics</i>, www.potto.org [4] Y. Nakayama, R.F. Boucher, <i>Introduction to fluid mechanics</i>, Butterworth-Heinemann. 2000. [5] John K. Vennard. <i>Elementary fluid mechanics</i>, John Wiley & Sons Inc. 1940

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	3						
	2	3						
	3	3						
Skills (Level: 1-7)	4							
	5					3		
	6							
Attitudes (Level: 1-5)	7							
	8							
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	3,0	0,0	0,0	0,0	3,0	0,0	0,0
L,M,H conversion*		M				M		

(Low); M (Medium); H (High)

*L

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Introduction: about the course; physical properties and important characteristics of fluids.	1,4	Attendance Q&A Homework 1	Reading materials before class; Doing the lecture; Discussion; and doing Quiz in class	[1] [2]
2.	2-3	Fluid Statics: Definition of pressure; Physical laws and basic equations for analyzing and determining pressure of a point in rest fluids; Methods to measure pressure.	2,4	Attendance Q&A Homework 1	Reading materials before class; Doing the lecture; Discussion; and doing Quiz in class	[1] [2]
3.	4-5	Fluid Statics: Hydrostatic force acting on the submerged surface; Buoyancy phenomena and buoyant force; Stability of floating body; Rigid-body rotation.	2,4	Attendance Q&A Homework 2	Reading materials before class; Doing the lecture; Discussion; and doing Quiz in class	[1] [2]
4.	6-7	The flow of an ideal fluids: Introduction; Bernoulli's Equation; Continuity equation; Flow rate measurement; Energy line and the hydraulic grade line.	3,4	Attendance Q&A Homework 3	Reading materials before class; Doing the lecture; Discussion; and doing Quiz in class,	[1] [2]
5.	8	The flow of a real fluids: Laminar and Turbulent flow; Fluid flow past solid boundaries; Fluid flow between parallel plates.	3,4	Attendance Q&A Homework 3	Reading materials before class; Doing the lecture; Discussion; and doing Quiz in class	[1] [2]
6.	9	Midterm				
7.	10-11	Fluid flow in pipes: Energy relationships; General mechanics of fluid flow in pipes; Friction and head losses in the pipes	3,4	Attendance Q&A Homework 4	Reading materials before class; Doing the lecture; Discussion; and doing Quiz in class	[1] [2]
8.	12	Fluid measurements	3,4	Attendance Q&A Homework 5	Reading materials before class;	[1] [2]

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
					Doing the lecture; Discussion; and doing Quiz in class	
9.	13-14	Flow about immersed objects Fundamentals and definitions; Drag problems; Lift problems	3,4	Attendance Q&A Homework 5	Reading materials before class; Doing the lecture; Discussion; and doing Quiz in class	[1] [2]
10.	15	Review				
11.	17	Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
Class attendance (10%)				Attended 80%Pass
In class activity: Discussion and doing Quiz in class (5%)				Participated in class Q&A 60%Pass
Homeworks (15%)				HW1-4, Submitted 80%Pass
Midterm exam (30%)	Q1-2, 60%Pass	Q3-4 60%Pass		
Final exam (40%)		Q1 70%Pass	Q3-5 70%Pass	

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

5. Rubrics (optional): No

6. Revision Date: May 20, 2023

Ho Chi Minh City, 20/5/2023

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	An ability to identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	An ability to communicate (in English) effectively with a range of audiences
4	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts



**VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY**
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Fluid Mechanics Lab

(Thực hành Cơ lưu chất)

Course Code: CE206IU

1. General information

Course designation	This course is primarily used as an undergraduate teaching lab. The experimental exercises will be provided to student for demonstrating the theory given in class lectures. These experiments are designed to examine some properties of fluids and to conduct experiments involving principle phenomena of incompressible (water) flow, such as: flow over the weir, head losses of flow in pipe.....																																								
Teaching schedule	☒ Year 1 ☐ Year 2 ☐ Year 3 ☐ Year 4 ☐ Year 5 ☐ Semester 1 ☒ Semester 2 ☐ Summer																																								
Person In-Charge	A/Prof. Phạm Ngọc, pngoc@hcmiu.edu.vn																																								
Language	English																																								
Relation to curriculum	☐ General ☒ Fundamental ☐ Specialization ☐ Project/Internship/Thesis			☒ Compulsory ☐ Elective																																					
Teaching methods	☒ Lecture ☒ Lesson ☐ Project ☐ Seminar Others, please specify:																																								
Workload	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th></th><th></th><th>Lecture</th><th>Lab</th><th>Project</th><th>Internship</th><th>Thesis</th></tr> </thead> <tbody> <tr> <td></td><td><i>Credit</i></td><td></td><td>1</td><td></td><td></td><td></td></tr> <tr> <td>Contact hours</td><td>25</td><td>0</td><td>25</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td>Self-Study hours</td><td>30</td><td>0</td><td>30</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td>Total workload</td><td>55</td><td>0</td><td>55</td><td>0</td><td>0</td><td>0</td></tr> </tbody> </table>								Lecture	Lab	Project	Internship	Thesis		<i>Credit</i>		1				Contact hours	25	0	25	0	0	0	Self-Study hours	30	0	30	0	0	0	Total workload	55	0	55	0	0	0
		Lecture	Lab	Project	Internship	Thesis																																			
	<i>Credit</i>		1																																						
Contact hours	25	0	25	0	0	0																																			
Self-Study hours	30	0	30	0	0	0																																			
Total workload	55	0	55	0	0	0																																			

Credit points	1								
Requirements for taking the course	☐ None ☐ Prerequisite course: <i>(Please specify course ID & course title, if any)</i> ☒ Parallel course: <i>Fluid Mechanics (CE205IU)</i> ☐ Previous course: <i>(Please specify course ID & course title, if any)</i>								
Course objectives	- To provide practical skills to determine some properties of fluids and conduct some experiments in Lab.								
Course learning outcomes	Upon the successful completion of this course, students will be able to: <table border="1"> <thead> <tr> <th>Competency level¹</th><th>Course learning outcome (CLO)</th></tr> </thead> <tbody> <tr> <td>Knowledge</td><td> CLO1. Describe and explain the mechanism of some basic flow phenomena [Understanding] CLO2. Demonstrate five fundamental experiments, including: Discharge over a notch; Reynolds number and transitional flow; Flow measurement apparatus; Jet trajectory and flow through an orifice; Fluid friction apparatus [Applying]. CLO3. Analyze the experiment data [Analysing]. </td></tr> <tr> <td>Skill</td><td>CLO4. Present skills of teamwork, communication, reporting and presentation [Set].</td></tr> <tr> <td>Attitude</td><td></td></tr> </tbody> </table>	Competency level ¹	Course learning outcome (CLO)	Knowledge	CLO1. Describe and explain the mechanism of some basic flow phenomena [Understanding] CLO2. Demonstrate five fundamental experiments, including: Discharge over a notch; Reynolds number and transitional flow; Flow measurement apparatus; Jet trajectory and flow through an orifice; Fluid friction apparatus [Applying]. CLO3. Analyze the experiment data [Analysing].	Skill	CLO4. Present skills of teamwork, communication, reporting and presentation [Set].	Attitude	
Competency level ¹	Course learning outcome (CLO)								
Knowledge	CLO1. Describe and explain the mechanism of some basic flow phenomena [Understanding] CLO2. Demonstrate five fundamental experiments, including: Discharge over a notch; Reynolds number and transitional flow; Flow measurement apparatus; Jet trajectory and flow through an orifice; Fluid friction apparatus [Applying]. CLO3. Analyze the experiment data [Analysing].								
Skill	CLO4. Present skills of teamwork, communication, reporting and presentation [Set].								
Attitude									
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i>								

¹ Level of competence according to Bloom's Taxonomy:

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x
Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination
Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x

	<u>Weight</u> : lecture session (3.3 hours)			
	<u>Teaching levels</u> : I (Introduce); T (Teach); U (Utilize)			
	No.	Topic	Weight	Level
	1	Introduction	1	I, T
	2	Discharge Over a Notch	1	T, U
	3	Reynolds Number and Transitional Flow	1	T, U
	4	Flow Measurement Apparatus	1	T, U
	5	Jet Trajectory and Flow Through an Orifice	1	T, U
	6	Fluid Friction Apparatus	1	T, U
Examination forms	☐ Multiple-choice questions ☐ Oral examination ☒ Report ☐ Written examination ☐ Presentation ☐ Others, please specify: ☐ Assignments			
Other requirements	<u>Attendance</u>: 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. <u>Assignments/Examination</u>: Students must have more than 50/100 points overall to pass this course.			
Reading list	I. Textbooks [1] Bruce R. Munson, Donald F. Young, Theodore H. Okiishi, <i>Fundamentals of fluid mechanics</i>, John Wiley & Sons Inc. 2006. [2]. Donald F. Elger, Barbara C. Williams, Clayton T. Crowe, John A. Roberson. <i>Engineering of Fluid Mechanics</i> (10th Edition). Wiley. 2014 II. References 			

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	2						
	2	3						
	3	4						
Skills (Level: 1-7)	4				2			
	5							
	6							
Attitudes (Level: 1-5)	7							
	8							
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	3,0	0,0	0,0	2,0	0,0	0,0	0,0
L,M,H conversion*		M			L			

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Introduction to the course, rules working in Lab, and using of equipment.	1		Lecture, practice	[1] [2]
2.	2	Discharge Over a Notch	2,3,4	Group report 1	Lecture, practice	[1] [2]
3.	3	Reynolds Number and Transitional Flow	2,3,4	Group report 2	Lecture, practice	[1] [2]
4.	4	Flow Measurement Apparatus	2,3,4	Group report 3	Lecture, practice	[1] [2]
5.	5	Jet Trajectory and Flow Through an Orifice	2,3,4	Group report 4	Lecture, practice	[1] [2]
6.	6	Fluid Friction Apparatus	2,3,4	Group report 5	Lecture, practice	[1] [2]
7.	7	Make-up class				
8.	8	Group presentation and evaluation		Oral examination	Presentation and Discussion	

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
Class participation/In-class activities (10%)				Checklist and observe 80%Pass
Group reports (80%)	Group HW (1-5) 80%Pass	Group HW (1-5) 80%Pass	Group HW (1-5) 80%Pass	
Oral presentation (10%)	A&Q 80%pass	A&Q 80%pass	A&Q 80%pass	A&Q 80%pass

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

5. Rubrics (optional): No

6. Revision Date: May 20, 2023

Ho Chi Minh City, 20/5/2023

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	An ability to identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	An ability to communicate (in English) effectively with a range of audiences
4	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
 School of Computer Science and Engineering

COURSE SYLLABUS
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	1
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: 127.5 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 37.5 (lecture) Private study including examination preparation, specified in hours: 90
Credit points	3 credits/ 4.64 ECTS
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 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.			
Course learning outcomes	Competency level	Course learning outcome (CLO)		
	Knowledge	CLO1. Understand entrepreneurial processes [Understanding]. CLO2. Apply new technology to boost business performance [Applying];		
	Skill	CLO3. Manage marketing strategy and financial statements in an enterprise [Mechanism];		
	Attitude	CLO4. Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts [Valuing]		
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> Weight: lecture session (3 hours) Teaching levels: I (Introduce); T (Teach); U (Utilize)			
	Topic		Weight	Level
	Entrepreneurship, Creativity and Innovation;		3	I, T
	Creative Problem Solving Model;		3	T, U
	Develop a Product. Generate Ideas and Protect Inventions;		2	T
	Marketing Strategies;		3	T, U
	Finance and Accounting		4	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. Duening & Hisrich & Lechter, Technology Entrepreneurship 2nd, 2014			

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Intended Learning Outcomes (ILO) (1-10) of the EV program is shown in the following table:

CLOs		ILOs									
		Knowledge		Skills						Attitudes	
		1	2	3	4	5	6	7	8	9	10
Knowledge (Level: 1-6)	1	2									
	2		3				3				
Skill (Level: 1-7)	3				4		4				
Attitudes (Level: 1-5)	4									3	
Contribution of CLOs to ILOs											
Bloom's Taxonomy	AVE	2.0	3.0	0.0	4.0	0.0	3.5	0.0	0.0	3.0	0.0
L,M,H conversion *		L	M		M		M			M	

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%	

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.

	Capstone	Milestone		Benchmark
	4	3	2	1
Evidence <i>Selecting and using information to investigate a point of view or conclusion</i>	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.

	Capstone	Milestone		Benchmark
	4	3	2	1
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: August 14, 2023

Ho Chi Minh City, 14/8/2023



**VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY**
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Engineering Project Management

(Quản lý dự án kỹ thuật)

Course Code: ENEE4011IU

1. General information

Course designation	This course is developed to provide the principal concept on project management which was characterized by the project management body of knowledge guide (PMBOK Guide). This guide emphasizes the five project process groups of initiating, planning, executing, controlling and closing, and the nine knowledge areas of project integration, scope, time, cost, quality, human resources, communication, risk, and procurement management.	
Teaching schedule	☐ Year 1 ☐ Year 2 ☐ Year 3 ☐ Year 4 ☐ Year 5 ☒ Semester 1 ☐ Semester 2 ☐ Summer	
Person In-Charge	Tran Van Ly	
Language	English	
Relation to curriculum	☒ General ☐ Fundamental ☐ Specialization ☐ Project/Internship/Thesis	☐ Compulsory ☒ Elective
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify:	

Workload			Lecture	Lab	Project	Internship	Thesis
		<i>Credit</i>	3				
	Contact hours	37.5	37.5	0	0	0	0
	Self-Study hours	90	90	0	0	0	0
	Total workload	127.5	127.5	0	0	0	0
Credit points	3						
Requirements for taking the course	☒ None ☐ Prerequisite course: <i>(Please specify course ID & course title, if any)</i> ☐ Parallel course: <i>(Please specify course ID & course title, if any)</i> ☐ Previous course: <i>(Please specify course ID & course title, if any)</i>						
Course objectives	Students will be provided with knowledge and skills of constructing the network (AON & AOA), GANNT Chart, solving the network; Resource allocation, resource loading & levelling; Project budgeting & cost estimation, risk management; Project quality management; Project human resource management; Project procurement management; Project executing, monitoring & control to closing the project						
Course learning outcomes	Upon the successful completion of this course, students will be able to:						
	Competency level¹	Course learning outcome (CLO)					
	Knowledge	CLO1. Align the project to the organization's strategic plans and business justification throughout its lifecycle; to identify project goals, constraints, deliverables, performance criteria, control needs, and resource requirements in consultation with stakeholders. [Applying] CLO2. Manage the scope, cost, timing, and quality of the project, at all times focused on project success as defined by project stakeholders Able to Implement general business					

¹ Level of competence according to Bloom's Taxonomy:

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x
Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination
Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x

		concepts, practices, and tools to facilitate project success. [Applying]																																																								
	Skill	CLO3. Work effectively in group project in a specific context; combining the techniques to conduct practical cases. Respond to the needs of community and industrial sectors. [Guided Response]																																																								
	Attitude	CLO4. Apply appropriate legal and ethical standards. Adapt project management practices to meet the needs of stakeholders from multiple sectors of the economy (i.e. consulting, government, arts, media, and charity organizations); Identify and follow strictly ethical disciplines in project management. [Organization]																																																								
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> <u>Weight</u>: lecture session (2.5 hours) <u>Teaching levels</u>: I (Introduce); T (Teach); U (Utilize) <table><tr><th>No.</th><th>Topic</th><th>Weight</th><th>Level</th></tr><tr><td>1</td><td>Introduction to Project Management</td><td>1</td><td>I, T</td></tr><tr><td>2</td><td>Project management processes for a project</td><td>1</td><td>I, T</td></tr><tr><td>3</td><td>Work breakdown structure</td><td>1</td><td>I, T</td></tr><tr><td>4</td><td>Project scheduling</td><td>1</td><td>I, T</td></tr><tr><td>5</td><td>Resource allocation</td><td>1</td><td>I, T</td></tr><tr><td>6</td><td>Logical Framework</td><td>2</td><td>I, T</td></tr><tr><td>7</td><td>Project cost management</td><td>1</td><td>I, T</td></tr><tr><td>8</td><td>Project risk management</td><td>1</td><td>I, T</td></tr><tr><td>9</td><td>Project quality management</td><td>1</td><td>I, T</td></tr><tr><td>10</td><td>Project human resource management</td><td>1</td><td>I, T</td></tr><tr><td>11</td><td>Project procurement management</td><td>1</td><td>I, T</td></tr><tr><td>12</td><td>Project executing, monitoring & control.</td><td>1</td><td>I, T</td></tr><tr><td>13</td><td>Project closing</td><td>1</td><td>I, T</td></tr></table>		No.	Topic	Weight	Level	1	Introduction to Project Management	1	I, T	2	Project management processes for a project	1	I, T	3	Work breakdown structure	1	I, T	4	Project scheduling	1	I, T	5	Resource allocation	1	I, T	6	Logical Framework	2	I, T	7	Project cost management	1	I, T	8	Project risk management	1	I, T	9	Project quality management	1	I, T	10	Project human resource management	1	I, T	11	Project procurement management	1	I, T	12	Project executing, monitoring & control.	1	I, T	13	Project closing	1	I, T
No.	Topic	Weight	Level																																																							
1	Introduction to Project Management	1	I, T																																																							
2	Project management processes for a project	1	I, T																																																							
3	Work breakdown structure	1	I, T																																																							
4	Project scheduling	1	I, T																																																							
5	Resource allocation	1	I, T																																																							
6	Logical Framework	2	I, T																																																							
7	Project cost management	1	I, T																																																							
8	Project risk management	1	I, T																																																							
9	Project quality management	1	I, T																																																							
10	Project human resource management	1	I, T																																																							
11	Project procurement management	1	I, T																																																							
12	Project executing, monitoring & control.	1	I, T																																																							
13	Project closing	1	I, T																																																							

Examination forms	☐ Multiple-choice questions ☐ Oral examination ☐ Report ☒ Written examination ☐ Presentation ☐ Others, please specify: ☐ Assignments
Other requirements	<u>Attendance:</u> 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. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.
Reading list	I. Textbooks [1] Book name: A Guide to the project management body of knowledge (PMBOK® Guide). 5th Edition, Newtown Square, Pa. : Project Management Institute, Inc. [2] Project management: A managerial approach / Jack R. Meredith, Samuel J. Mantel. 7th Edition, Hoboken, N.J. : Wiley ; Chichester : John Wiley [distributor], 2009. [3] The project management life cycle/ Jason West land. Kogan Page Limited, 2006 II. References N/A

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1		6					
	2		6					
Skills (Level: 1-7)	3				6			
Attitudes (Level: 1-5)	4							5
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	0.0	6.0	0.0	6.0	0.0	0.0	5.0
L,M,H conversion*			H		H			H

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Lecture 1: Introduction to Project Management, project life cycle and organization	1		Lecture, Group work	[1].
2.	2	Lecture 2: Project management processes for a project - Common project management process interactions. - Project management process groups. - Initiating process group Planning process group	1	HW 1	Lecture, Group work	[1].
3.	3	Lecture 3: Work breakdown structure	1,3,4	HW 2	Lecture, Group work	[1].
4.	4	Lecture 4: Project scheduling. - Constructing the network: AON & AOA - Gantt chart - Solving the network Using Microsoft Project software	1,3,4	HW 3	Lecture, Group work	[1].
5.	5	Lecture 5: Resource allocation - Critical path method – Crashing a project - Resource allocation problem - Resource loading - Resource leveling Constrained resource scheduling	1,3,4	HW 4	Lecture, Group work	[1].
6.	6-7	Lecture 6: Logical Framework Approach (LFA)	3		Lecture, Group work	[1].

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
7.	8	Review for Midterm				
8.		Midterm				
9.	9	Lecture 7: Project cost management Project budgeting & Cost estimation - Top-Down budgeting - Bottom-Up budgeting Improving the process of cost estimation	2, 3, 4	HW 5	Lecture, Group work	[1].
10.	10	Lecture 8: Risk management. - Risk management planning - Risk identification - Risk analysis - Risk monitoring and control Using Crystal Ball software		HW 6	Lecture, Group work	
11.	11	Lecture 9: Project quality management - Plan quality - Perform quality assurance Perform quality control	2, 3, 4	HW 7	Lecture, Group work	[1].
12.	12	Lecture 10: Project human resource management - Develop human resource plan - Acquire project team - Develop project team Manage project team	2, 3, 4	HW 8	Lecture, Group work	[1].
13.	13	Lecture 11: Project procurement management - Plan procurements - Conduct procurements - Administer procurements Close procurements	2, 3, 4	HW 9	Lecture, Group work	[1].

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
14.	14	Lecture 12: Project executing, monitoring & control.	2, 3, 4	HW 10	Lecture, Group work	[1].
15.	15	Lecture 13: Project closing Project Presentation Review for Final Exam	2, 3, 4		Problems solving Group work	[1].
16.		Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
In-class exercises/quizzes (10%)	HW1-2 50%Pass	HW4, HW5, HW6 50%Pass	HW7-8 50%Pass	HW9-10 50%Pass
Homework exercises (20%)	Q1 50%Pass	Q2 50%Pass	Q3, Q4 50%Pass	
Midterm exam (30%)	Q1 50%Pass	Q2 50%Pass	Q3, Q4 50%Pass	
Final exam (40%)	HW1-2 50%Pass	HW4, HW5, HW6 50%Pass	HW7-8 50%Pass	HW9-10 50%Pass

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

5. Rubrics (optional): No

6. Revision Date: May 20, 2023

Ho Chi Minh City, 20/5/2023

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Introduction to Business Administration

(Nhập môn Quản trị kinh doanh)

Course Code: BA115IU

1. General information

Course designation	Employing the interactive learning and problem-based teaching approach, this course emphasizes the interaction between lecturers and students. The lecture materials will be uploaded in Blackboard to help the students to preview the materials and to concentrate on listening and critical thinking during the lecture. This will help students to interact with the lecturer during the classroom. The sessions for presentations and discussions comprise company case studies as well as answering some theoretical and conceptual questions, which help the students to see how the concepts are applied in the real business context. Students will present the case to the class and discuss with the peers. Guest speakers are invited to talk about selected topics or real-life experiences.	
Teaching schedule	☐ Year 1 ☐ Year 2 ☐ Year 3 ☐ Year 4 ☐ Year 5 ☐ Semester 1 ☐ Semester 2 ☐ Summer	
Person In-Charge	Lecturers of School of Business	
Language	English	
Relation to curriculum	☒ General ☐ Fundamental ☐ Specialization ☐ Project/Internship/Thesis	☐ Compulsory ☒ Elective
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify:	

Workload			Lecture	Lab	Project	Internship	Thesis
		<i>Credit</i>	3				
	Contact hours	37.5	37.5	0	0	0	0
	Self-Study hours	90	90	0	0	0	0
	Total workload	127.5	127.5	0	0	0	0
Credit points	3						
Requirements for taking the course	☒ None ☐ Prerequisite course: <i>(Please specify course ID & course title, if any)</i> ☐ Parallel course: <i>(Please specify course ID & course title, if any)</i> ☐ Previous course: <i>(Please specify course ID & course title, if any)</i>						
Course objectives	This course is designed to provide the student with the below objectives - To provide knowledge of functional areas of business management and the integration among them. - To give students a strong awareness of global issues, including an understanding of approaches to business ethics, business environment and multinational issues. - To develop students' basic research, analysis, writing, teaming, and presentation skills. - To develop students' applied critical thinking skills and communication through the development of a portfolio of a firm in an industry in which they are interested.						
Course learning outcomes	Upon the successful completion of this course, students will be able to:						
	Competency level¹	Course learning outcome (CLO)					
	Knowledge	CLO1. Explain how rapidly the business world is changing and the importance of lifelong learning. [Understanding] CLO2. Explain how global issues influence business entities. [Understanding]					

¹ Level of competence according to Bloom's Taxonomy:

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x
Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination
Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x

		CLO3. Understanding forms of business of ownership. [Understanding] CLO4. Develop a high level of familiarity with four function of business management. [Understanding] CLO5. Understanding basic characteristic of production and operation management. [Understanding] CLO6. Explain theories about motivation. [Understanding] CLO7. Understanding basic characteristic of HRM in an organization. [Understanding] CLO8. Understanding basic characteristic of marketing mix. [Understanding]																																																				
	Skill																																																					
	Attitude																																																					
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> <u>Weight</u>: lecture session (2.5 hours) <u>Teaching levels</u>: I (Introduce); T (Teach); U (Utilize) <table><tr><th>No.</th><th>Topic</th><th>Weight</th><th>Level</th></tr><tr><td>1</td><td>Chapter 1: Managing Within The Dynamic Business Environment: Taking Risks And Making Profits</td><td></td><td>I, T</td></tr><tr><td>2</td><td>Chapter 2: How Economics Affects Business: the Creation and Distribution of Wealth <i>Short essay</i></td><td></td><td>T, U</td></tr><tr><td>3</td><td>Chapter 3: Choosing a Form of Business Ownership</td><td></td><td>T, U</td></tr><tr><td>4</td><td>Chapter 4: Management, Leadership, And Employee Empowerment <i>Short essay</i></td><td></td><td>T, U</td></tr><tr><td>5</td><td>Chapter 5 Adapting Organizations To Today’s Markets</td><td></td><td>I, T,U</td></tr><tr><td>6</td><td>Review for midterm</td><td></td><td></td></tr><tr><td>7</td><td>Chapter 6 Producing World-Class Goods and Services</td><td></td><td>T,U</td></tr><tr><td>8</td><td>Chapter 7 Motivating Employees And Building Self-Managed Teams</td><td></td><td>T,U</td></tr><tr><td>9</td><td>Chapter 8 HRM: Finding and Keeping the Best Employees</td><td></td><td>T,U</td></tr><tr><td>10</td><td>Chapter 9 Marketing: Building Customer Relationships</td><td></td><td>T,U</td></tr><tr><td>11</td><td>Chapter 10 Developing and Pricing Products and Services</td><td></td><td>T,U</td></tr><tr><td>12</td><td>Chapter 11 Distributing Products Quickly and Efficiently</td><td></td><td>T,U</td></tr></table>		No.	Topic	Weight	Level	1	Chapter 1: Managing Within The Dynamic Business Environment: Taking Risks And Making Profits		I, T	2	Chapter 2: How Economics Affects Business: the Creation and Distribution of Wealth <i>Short essay</i>		T, U	3	Chapter 3: Choosing a Form of Business Ownership		T, U	4	Chapter 4: Management, Leadership, And Employee Empowerment <i>Short essay</i>		T, U	5	Chapter 5 Adapting Organizations To Today’s Markets		I, T,U	6	Review for midterm			7	Chapter 6 Producing World-Class Goods and Services		T,U	8	Chapter 7 Motivating Employees And Building Self-Managed Teams		T,U	9	Chapter 8 HRM: Finding and Keeping the Best Employees		T,U	10	Chapter 9 Marketing: Building Customer Relationships		T,U	11	Chapter 10 Developing and Pricing Products and Services		T,U	12	Chapter 11 Distributing Products Quickly and Efficiently		T,U
No.	Topic	Weight	Level																																																			
1	Chapter 1: Managing Within The Dynamic Business Environment: Taking Risks And Making Profits		I, T																																																			
2	Chapter 2: How Economics Affects Business: the Creation and Distribution of Wealth <i>Short essay</i>		T, U																																																			
3	Chapter 3: Choosing a Form of Business Ownership		T, U																																																			
4	Chapter 4: Management, Leadership, And Employee Empowerment <i>Short essay</i>		T, U																																																			
5	Chapter 5 Adapting Organizations To Today’s Markets		I, T,U																																																			
6	Review for midterm																																																					
7	Chapter 6 Producing World-Class Goods and Services		T,U																																																			
8	Chapter 7 Motivating Employees And Building Self-Managed Teams		T,U																																																			
9	Chapter 8 HRM: Finding and Keeping the Best Employees		T,U																																																			
10	Chapter 9 Marketing: Building Customer Relationships		T,U																																																			
11	Chapter 10 Developing and Pricing Products and Services		T,U																																																			
12	Chapter 11 Distributing Products Quickly and Efficiently		T,U																																																			
Examination forms	☐ Multiple-choice questions ☐ Oral examination ☐ Report ☒ Written examination																																																					

	☐ Presentation ☐ Others, please specify: ☐ Assignments
Other requirements	<u>Attendance:</u> 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. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.
Reading list	I. Textbooks [1] William G. Nickels, James M. McHugh, Susan M. McHugh – Understanding Business, 11th edition, McGraw-Hill II. References N/A

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-8) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1		1					
	2		1					
	3		1					
	4		1					
	5		1					
	6		1					
	7		1					
	8		1					
Skills (Level: 1-7)								
Attitudes (Level: 1-5)								
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	0.0	1.0	0.0	0.0	0.0	0.0	0.0
L,M,H conversion*			L					

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Chapter 1: Managing Within The Dynamic Business Environment: Taking Risks And Making Profits		Discussion: How to recognize risks and opportunities	Lecture, Discussion	[1]
2.	2	Chapter 2: How Economics Affects Business: the Creation and Distribution of Wealth		<u>Written Plan:</u> Length and Style: 500 words 1.5 spaced	Lecture, Short essay	[1]
3.	3	Chapter 5: Choosing a Form of Business Ownership		Discussion & Participation	Lecture, Group work	[1]
4.	4	Chapter 7: Management, Leadership, And Employee Empowerment <i>Short essay</i>		Q&A	Lecture, Short essay	[1]
5.	5	Chapter 8 Adapting Organizations To Today's Markets		Q&A	Lecture, Discussion	[1]
6.	6	Review for midterm		Q&A	Review	
7.	7	Midterm				
8.	8	Chapter 9 Producing World-Class Goods and Services		Business plan project	Lecture, HW	[1]
9.	9	Chapter 10 Motivating Employees and Building Self-Managed Teams		Discussion & Participation	Lecture, Discussion	[1]
10.	10	Chapter 11 HRM: Finding and Keeping the Best Employees		Discussion & Participation	Lecture, Discussion	[1]
11.	11	Chapter 13 Marketing: Building Customer Relationships		Q&A	Lecture, Discussion	[1]
12.	12	Chapter 14 Developing and Pricing Products and Services		Business plan project	Lecture, Discussion	[1]
13.	13	Chapter 15 Distributing Products Quickly and Efficiently		Q&A	Lecture, Discussion	[1]
14.	14	Chapter 16 Using Effective Promotional Techniques		Group work	Lecture, Discussion	[1]
15.	15	COURSE REVIEW		Q&A	Review, Q&A	
16.	16	GROUP PRESENTATION AND REPORT SUBMISSION		Q&A	Group presentation	
17.	17	Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
In-class exercises/quizzes (10%)	x		x	
Homework exercises (20%)		x		
Midterm exam (30%)	x			
Final exam (40%)		x		x

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

5. Rubrics (optional): No

6. Revision Date: May 20, 2023

Ho Chi Minh City, 20/5/2023

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Entrepreneurship and Small Business Management
(Khởi nghiệp và quản lý doanh nghiệp nhỏ)

Course Code: BA1511IU

1. General information

Course designation	This course aims to provide a hands-on introduction to the scalable venture creation process for students with a strong interest in entrepreneurship. The course is designed for a variety of student interests. It directly addresses the concerns of students wanting to become entrepreneurs in the near or more distant future. It is also useful to anyone who expects to be interacting with entrepreneurs in their business careers. Finally, this course is useful for anybody with a curious mind and a willingness to combine serious analysis with creative thinking.		
Teaching schedule	☐ Year 1 ☐ Year 2 ☐ Year 3 ☐ Year 4 ☐ Year 5 ☒ Semester 1 ☒ Semester 2 ☒ Summer		
Person In-Charge	Nguyen Vo Hien Chau, nvhchau@hcmiu.edu.vn		
Language	English		
Relation to curriculum	☒ General ☐ Fundamental ☐ Specialization ☐ Project/Internship/Thesis	☐ Compulsory ☒ Elective	
Teaching methods	☒ Lecture ☐ Lesson ☒ Project ☐ Seminar Others, please specify:		

Workload			Lecture	Lab	Project	Internship	Thesis
		Credit	3				
	Contact hours	37.5	37.5	0	0	0	0
	Self-Study hours	90	90	0	0	0	0
	Total workload	127.5	127.5	0	0	0	0
Credit points	3						
Requirements for taking the course	☐ None ☐ Prerequisite course: (Please specify course ID & course title, if any) ☐ Parallel course: (Please specify course ID & course title, if any) ☐ Previous course: (Please specify course ID & course title, if any)						
Course objectives	After studying this course, the students would be able to build on personal as well as external resources with a view to successfully launching and subsequently managing their enterprises. They would have not only a definite idea as to which support/developmental agency to look up to and for what purpose, but also the necessary know-how and wherewithal for accessing their help. They would have basic skills in operations, finance, marketing, and human resource management.						
Course learning outcomes	Upon the successful completion of this course, students will be able to:						
	Competency level ¹	Course learning outcome (CLO)					
	Knowledge	CLO1. Describe overall startup business knowledge. [Understanding]					
	Skill	CLO2: Analyze various new business options in order to choose appropriate startup idea. [Mechanism] CLO3: Prepare a plan to call for funding with a complete written business plan and pitching presentation. [Adaptation]					
	Attitude	CLO4. Display entrepreneurship spirit from a curious mind and a willingness to combine serious analysis with creative thinking. [Organization]					
Content	The description of the contents should clearly indicate the weighting of the content and the level.						

¹ Level of competence according to Bloom's Taxonomy:

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x
Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination
Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1		1					
Skills (Level: 1-7)	2						1	
	3						1	
Attitudes (Level: 1-5)	4							1
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	0.0	1.0	0.0	0.0	0.0	1.0	1.0
L,M,H conversion*			L				L	L

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	The Foundations of Entrepreneurship	1	<u>Discussion 1:</u> 1.Search through recent business publications (especially those focusing on small companies) and find an example of an entrepreneur, past or present, who exhibits the entrepreneurial spirit of striving for success in the face of failure.2. Do you want to become an entrepreneur? Why? Prepare a brief report for your class (300 words).	Lecture, Discussion	[1]
2.	2	Creative and Innovation: Keys to Entrepreneurial success	1,4	<u>Discussion 2:</u> Find an easily available product (for example, a pen). Think of all the creative ways the product can be used. You need to prepare at least 10 alternative uses including unconventional methods for that particular product.	Lecture, Discussion	[1]

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
3.	3-4-5	Conducting a Feasibility analysis and designing a business model	1,2	<u>Discussion 3:</u> 1. Five Forces Model of Highlands Coffee. 2. Value Proposition Canvas of Grab Car/bike 3. Business Model Canvas of Grab Car/bike <u>Feasibility Analysis Presentation:</u> Each group will choose 01 new start up business (already started up by someone else) and conduct a feasibility analysis. Please note that the business you choose should be established less than 5 years. It's up to you to choose which industry and which company to analyze, but to save time, you can choose the business in the same industry with your business idea. The presentation should have three main parts: 1.Introduction of the business (Its name, Founder, Product/Service, Established year, Business size, current situation) 2. A feasibility analysis includes: -Industry and Market feasibility -Product or Services feasibility -Financial Feasibility 3.Discussion: your group opinion about the success/failure, challenge, and opportunity of the business.	Lecture, Discussion, Group presentation	[1] [2]
4.	6	Crafting a Business Plan and Building a solid strategic plan	1,3	<u>Class Discussion:</u> 1. Advantages and Disadvantages of SWOT analysis 2. Prepare a competitive profile matrix for Shopee. Choose 1 of your favorite company. Find at least 4 of its competitors. Put all of them in a Positioning map	Lecture, Discussion	[1][2][3]
5.	7	Building a powerful bootstrap marketing plan	1,3	<u>Discussion 5:</u> Select 2 businesses (1 large and 1 small) and play the role of "Mystery shopper" 1.How would you rate their service, quality, and convenience of each of the businesses based on your mystery shopper experience? 2.Compare and contrast the staff at the two stores based on how helpful, friendly, professional, and courteous they were to you during your mystery shopper visits?	Lecture, Discussion	[1][2][3]

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
				3. How would you describe each company's competitive advantage based on your mystery shopper visits?		
6.	8	Pricing strategy	1,3	<u>Discussion 6:</u> Apple Inc. dominates the market for tablets with its line of iPads, which currently includes the classic iPad, the iPad Mini, and the iPad Air. Because the company constantly introduces new models and features, it also adjusts prices on these popular devices. Use the Web to research the history of the iPad and write a brief summary of Apple's pricing strategy on its tablet. Which products compete with the iPad?	Lecture, Discussion	[1]
7.	9-10	Midterm				
8.	11	E-commerce and the entrepreneur	1,2, 3	<u>Discussion 7:</u> Select one online company with which you are familiar and visit their Web sites. What percentage of them have privacy policies posted on their sites? View the Web site and provide comments based on what you have studied in this chapter. Does the Web site follow the techniques of designing a killer Web site? You may provide some suggestions to the business owner for improvement.	Lecture, Discussion , HW	[1]
9.	12	Creating a successful financial plan	1,3	<u>Discussion 8:</u> 1. Find a publicly held company of interest to you that provides its financial statements on the Web. You can conduct a Web search using the company's name, or you can find lists of companies at the Securities and Exchange Commission's EDGAR database or visit AnnualReports.com to download the annual report of a company that interests you. 2. Analyze the company's financial statements by calculating the first 3 ratios covered in this chapter and compare these ratios to industry averages found in RMA's <i>Annual Statement Studies</i> , <i>Bizminer</i> , or one of the other financial analysis resources found in your library. 3. Do you spot any problem areas in the company's financials?	Lecture, Discussion , HW	[1]

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
				4. What are the financial strengths of the company?		
10.	12-13	Managing cash flow	1,2,3	Make a cash flow management for your monthly expense.	Lecture, Exercise	[1]
11.	13	Sources of Financing: Equity vs Debt	1,3,4	<u>Discussion 9:</u> Interview or find an article on the internet several local business owners about how they financed their businesses. (you can easily find it in Shark Tank TV Show or other sources) 1. Where did the initial capital come from for the small business owners you interviewed/or found? 2. Ask the small business owners or find in the article how much money they needed to launch their businesses. 3. Ask the small business owners how they raised the additional capital they needed to start their businesses. 4. Ask the small business owners about any advice they might offer others seeking capital? (if applicable)	Lecture, Discussion, HW	[1]
12.	14	Choosing the right location and layout	1,3	<u>Discussion 10:</u> What factors should a seafood processing plant, a beauty shop, and an exclusive jewelry store consider in choosing a location? List factors for each type of business	Lecture, Discussion,	[1]
13.	15	Buying an existing business	1,2,4		Lecture, Discussion	[1]
14.	15	Franchising and the Entrepreneur	1,2,4		Lecture, Discussion	[1]
15.	15	Business Plan Review	1,2,3,4	<u>Written Plan:</u> Length and Style: 6,000 words (+-10%), excluding footnotes, figures and references. The format for assignments is to be 1.5 spaced with 2.5 cm margins and font size of 12 cpi. Please show the word count, along with all other details on the cover sheet. The business plan will be assessed for analytical content and presentation. The business plan must be submitted before presented. Peer reviews to evaluate each member's contribution to the group work and define your final grade. All work must be original and must not have been submitted for any other subject or course here or elsewhere. Copying or plagiarizing	Review, Q&A	

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
				works of other authors, including your fellow students or cutting and pasting from the internet and other sources is an offence and will be seriously penalized. <u>Final Presentation:</u> Duration: 10 minutes presentation + 5 minutes Q&A Please present as if you were in a business idea competition or finding funds for your business. BE PROFESSIONAL!		
16.	16-17	Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
In-class exercises/quizzes (10%)	Feasibility Analysis 70% Pass	Feasibility Analysis 70% Pass		
Homework exercises (20%)	HW 70%Pass	HW 70%Pass		
Midterm exam (30%)	Q: 1-40 70% Pass			
Final exam (40%)	Written Plan 70% Pass	Written Plan 70%Pass	Written Plan & Presentation 70%Pass	Written Plan 70%Pass

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

5. Rubrics (optional): No

6. Revision Date: May 20, 2023

Ho Chi Minh City, 20/5/2023

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: INTRODUCTION TO CHEMICAL ENGINEERING

(Nhập môn kỹ thuật hóa học)

Course Code: CHE1011IU

1. General information

Course designation	This course will introduce students to the engineering profession and the field of chemical engineering, guide students through the principles of engineering design and problem solving, and help students develop teamwork, time-management, and communication skills.		
Teaching schedule	☐ Year 1 ☒ Year 2 ☐ Year 3 ☐ Year 4 ☐ Year 5 ☒ Semester 1 ☐ Semester 2 ☐ Summer		
Person In-Charge	Dr. Huynh Kim Lam		
Language	English		
Relation to curriculum	☐ General ☒ Fundamental ☐ Specialization ☐ Project/Internship/Thesis	☒ Compulsory ☐ Elective	
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify:		

Workload			Lecture	Lab	Project	Internship	Thesis
		<i>Credit</i>	2				
	Contact hours	25	25	0	0	0	0
	Self-Study hours	60	60	0	0	0	0
	Total workload	85	85	0	0	0	0
Credit points	2						
Requirements for taking the course	☒ None ☐ Prerequisite course: <i>(Please specify course ID & course title, if any)</i> ☐ Parallel course: <i>(Please specify course ID & course title, if any)</i> ☐ Previous course: <i>(Please specify course ID & course title, if any)</i>						
Course objectives	Upon successful completion of this course, the students should: – Demonstrate a broad and general understanding of the Chemical Engineering profession including: + Identify the types of technical and societal problems that chemical engineers work to address; + Explain clear and reasonable long-term plans for a variety of academic and professional career paths available to chemical engineers; and + Identify ethical concerns associated with the chemical engineering profession. – Solve introductory problems associated with multiple areas of core chemical engineering curriculum by + Perform simple mass and energy balances on a system. + Analyze simple circuits using Ohms and Kirchhoff's Laws and relate them to concepts of fluid mechanics and heat/mass transfer. + Determine fluid properties in static systems and elementary dynamic systems using Bernoulli's principles. + Calculate the resistance to heat transfer and determine steady state temperatures for simple systems. – Determine the stoichiometric coefficients and rate constant of an irreversible elementary reaction in a batch reactor.						
Course learning outcomes	Upon the successful completion of this course, students will be able to:						
	Competency level	Course learning outcome (CLO)					
	Knowledge	CLO1. Describe the roles of chemical engineers and its relation to other disciplines CLO2. Apply introductory chemical engineering concepts					
	Skill	CLO3. Take measurements and perform a statistical analysis of the data					

		CLO4. Conduct basic calculations used in chemical and engineering when designing or analyzing chemical processes CLO5. Effectively communicate her/his work in written and oral form																																				
	Attitude																																					
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> Weight: lecture session (2.5 hours) Teaching levels: I (Introduce); T (Teach); U (Utilize) <table><tr><th>No.</th><th>Topic</th><th>Weight</th><th>Level</th></tr><tr><td>1</td><td>Mass balance</td><td>1</td><td>I, T</td></tr><tr><td>2</td><td>Membrane separation</td><td>2</td><td>T, U</td></tr><tr><td>3</td><td>Chemically reacting systems</td><td>1</td><td>T, U</td></tr><tr><td>4</td><td>Designing reactors</td><td>2</td><td>T</td></tr><tr><td>5</td><td>Overcoming equilibrium</td><td>2</td><td>T, U</td></tr><tr><td>6</td><td>Two phase systems and interfacial mass transfer</td><td>2</td><td>T</td></tr><tr><td>7</td><td>Equilibrium staged processes</td><td>1</td><td>T, U</td></tr><tr><td>8</td><td>Energy balances and heat exchanges</td><td>1</td><td>T, U</td></tr></table>		No.	Topic	Weight	Level	1	Mass balance	1	I, T	2	Membrane separation	2	T, U	3	Chemically reacting systems	1	T, U	4	Designing reactors	2	T	5	Overcoming equilibrium	2	T, U	6	Two phase systems and interfacial mass transfer	2	T	7	Equilibrium staged processes	1	T, U	8	Energy balances and heat exchanges	1	T, U
No.	Topic	Weight	Level																																			
1	Mass balance	1	I, T																																			
2	Membrane separation	2	T, U																																			
3	Chemically reacting systems	1	T, U																																			
4	Designing reactors	2	T																																			
5	Overcoming equilibrium	2	T, U																																			
6	Two phase systems and interfacial mass transfer	2	T																																			
7	Equilibrium staged processes	1	T, U																																			
8	Energy balances and heat exchanges	1	T, U																																			
Examination forms	☐ Multiple-choice questions ☐ Report ☐ Presentation ☐ Assignments ☐ Oral examination ☒ Written examination ☐ Others, please specify:																																					
Other requirements	<u>Attendance:</u> 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. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.																																					
Reading list	Morton Denn, Chemical Engineering - An Introduction (Cambridge Series in Chemical Engineering), 2011, Cambridge University Press																																					

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-5) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	3						
	2		3					
Skills (Level: 1-7)	3				3			
	4					2		
Attitudes (Level: 1-5)	5							2
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	3.0	0.0	0.0	3.0	2.0	3.0	2.0
L,M,H conversion*		M			M	L	M	L

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

Week	Content	Learning outcome	Teaching and learning activities	Assessment
1	Introduction to chemical engineering		- Lecture - Class discussion	
2	Basic concept of analysis		- Lecture - Class discussion	Homework
3	The balance equation Components of mass balance		- Lecture - Class discussion	Homework
4	Membrane separation		- Lecture - Class discussion	Homework
5	Chemically reacting systems		- Lecture - Class discussion	Homework
6	Designing reactors		- Lecture - Class discussion	Homework
7	Bioreactors and nonlinear systems		- Lecture - Class discussion	
8	Overcoming equilibrium		- Lecture - Class discussion	
MIDTERM EXAM				Quiz and Written exam
10, 11	Two phase systems and interfacial mass transfer		- Lecture - Class discussion	Homework
12	Equilibrium staged processes		- Lecture	Homework

			- Class discussion	
13	Energy balances		- Lecture - Class discussion	Homework
14	Heat exchanges		- Lecture - Class discussion	Homework
15	Energy balances for multicomponent systems		- Lecture - Class discussion	Homework
16	Energy balances for reacting systems		- Lecture - Class discussion	Homework
17	Project presentation		- Written report and oral presentation	Group project
FINAL EXAMINATION				Quiz and Written exam

4. 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.

5. Date revised: May 20, 20223

Ho Chi Minh City, 20/5/2023

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	An ability to identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	An ability to communicate (in English) effectively with a range of audiences
4	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

RECORD OF REVISIONS

No.	Session/Page	Content of revision	Date of revision	Revised by



**VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering**

COURSE SYLLABUS

Course Name: Inorganic Chemistry

(Hóa vô cơ)

Course Code: CHE2103IU

1. General information

Course designation	This course is designed to provide students with a broad knowledge and understanding of atomic properties, molecular structure, and properties of inorganic complexes and compounds.																																								
Teaching schedule	☒ Year 1 ☐ Year 2 ☐ Year 3 ☐ Year 4 ☐ Year 5 ☐ Semester 1 ☒ Semester 2 ☐ Summer																																								
Person In-Charge	Dr. Phùng Thanh Khoa, ptkhoa@hcmiu.edu.vn																																								
Language	English																																								
Relation to curriculum	☐ General ☒ Fundamental ☐ Specialization ☐ Project/Internship/Thesis			☒ Compulsory ☐ Elective																																					
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify:																																								
Workload	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th></th><th></th><th>Lecture</th><th>Lab</th><th>Project</th><th>Internship</th><th>Thesis</th></tr> </thead> <tbody> <tr> <td></td><td><i>Credit</i></td><td>3</td><td></td><td></td><td></td><td></td></tr> <tr> <td>Contact hours</td><td>37.5</td><td>37.5</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td>Self-Study hours</td><td>90</td><td>90</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td>Total workload</td><td>127.5</td><td>127.5</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> </tbody> </table>								Lecture	Lab	Project	Internship	Thesis		<i>Credit</i>	3					Contact hours	37.5	37.5	0	0	0	0	Self-Study hours	90	90	0	0	0	0	Total workload	127.5	127.5	0	0	0	0
		Lecture	Lab	Project	Internship	Thesis																																			
	<i>Credit</i>	3																																							
Contact hours	37.5	37.5	0	0	0	0																																			
Self-Study hours	90	90	0	0	0	0																																			
Total workload	127.5	127.5	0	0	0	0																																			
Credit points	3																																								

Requirements for taking the course	☐ None ☐ Prerequisite course: <i>(Please specify course ID & course title, if any)</i> ☒ Parallel course: <i>Inorganic Chemistry Lab (CHE2104IU)</i> ☐ Previous course: <i>(Please specify course ID & course title, if any)</i>					
Course objectives	Upon successful completion of this course, the students should be able to demonstrate knowledge of: • Electronic structure of the atom, • Main group chemistry. • Connection between electronic structure and molecular properties. • Symmetry elements in molecules and assign molecules to the appropriate point group. • Several theories of bonding, the advantages and disadvantages of each theory, and which theory is most useful for each type of inorganic molecule. • Solvent systems and acid-base behavior • Ionic bonding and solid-state behavior. Features of organometallic chemistry					
Course learning outcomes	Upon the successful completion of this course, students will be able to: <table><tr><th>Competency level¹</th><th>Course learning outcome (CLO)</th></tr><tr><td>Knowledge</td><td>CLO1. Be able to apply knowledge in mathematics, science in solving problems related to inorganic chemistry [Evaluating]. CLO2. Apply engineering design using inorganic chemistry knowledge to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors [Applying].</td></tr></table>		Competency level ¹	Course learning outcome (CLO)	Knowledge	CLO1. Be able to apply knowledge in mathematics, science in solving problems related to inorganic chemistry [Evaluating]. CLO2. Apply engineering design using inorganic chemistry knowledge to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors [Applying].
Competency level ¹	Course learning outcome (CLO)					
Knowledge	CLO1. Be able to apply knowledge in mathematics, science in solving problems related to inorganic chemistry [Evaluating]. CLO2. Apply engineering design using inorganic chemistry knowledge to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors [Applying].					

¹ Level of competence according to Bloom's Taxonomy:

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x
Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination
Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x

	<table><tr><td>Skill</td><td>CLO3. Acquire and apply new knowledge as needed, using appropriate learning strategies [Set].</td></tr><tr><td>Attitude</td><td>CLO4. Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts [Valuing].</td></tr></table>	Skill	CLO3. Acquire and apply new knowledge as needed, using appropriate learning strategies [Set].	Attitude	CLO4. Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts [Valuing].																																																
Skill	CLO3. Acquire and apply new knowledge as needed, using appropriate learning strategies [Set].																																																				
Attitude	CLO4. Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts [Valuing].																																																				
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> <u>Weight</u>: lecture session (2.5 hours) <u>Teaching levels</u>: I (Introduce); T (Teach); U (Utilize) <table><tr><th>No.</th><th>Topic</th><th>Weight</th><th>Level</th></tr><tr><td>1</td><td>Introduction to inorganic chemistry</td><td>1</td><td>I, T</td></tr><tr><td>2</td><td>Atomic Structure and Properties</td><td>1</td><td>I, T</td></tr><tr><td>3</td><td>Bonding Theories</td><td>1</td><td>I, T</td></tr><tr><td>4</td><td>Symmetry and Group Theory</td><td>2</td><td>I, T, U</td></tr><tr><td>5</td><td>Molecular Orbital Theory</td><td>2</td><td>I, T</td></tr><tr><td>6</td><td>Acid-Base Chemistry Donor-Acceptor Chemistry</td><td>1</td><td>I, T, U</td></tr><tr><td>7</td><td>Solid State-Structure and Bonding</td><td>1</td><td>I, T, U</td></tr><tr><td>8</td><td>Chemistry of the Main Group Elements</td><td>1</td><td>I, T</td></tr><tr><td>9</td><td>Coordination Chemistry: Structures and Isomers</td><td>1</td><td>I, T, U</td></tr><tr><td>10</td><td>Coordination Chemistry: Reactions and Mechanisms</td><td>1</td><td>I, T, U</td></tr><tr><td>11</td><td>Organometallic Chemistry</td><td>1</td><td>I, T</td></tr><tr><td>12</td><td>Organometallic Reactions and Catalysis</td><td>1</td><td>I, T</td></tr></table>	No.	Topic	Weight	Level	1	Introduction to inorganic chemistry	1	I, T	2	Atomic Structure and Properties	1	I, T	3	Bonding Theories	1	I, T	4	Symmetry and Group Theory	2	I, T, U	5	Molecular Orbital Theory	2	I, T	6	Acid-Base Chemistry Donor-Acceptor Chemistry	1	I, T, U	7	Solid State-Structure and Bonding	1	I, T, U	8	Chemistry of the Main Group Elements	1	I, T	9	Coordination Chemistry: Structures and Isomers	1	I, T, U	10	Coordination Chemistry: Reactions and Mechanisms	1	I, T, U	11	Organometallic Chemistry	1	I, T	12	Organometallic Reactions and Catalysis	1	I, T
No.	Topic	Weight	Level																																																		
1	Introduction to inorganic chemistry	1	I, T																																																		
2	Atomic Structure and Properties	1	I, T																																																		
3	Bonding Theories	1	I, T																																																		
4	Symmetry and Group Theory	2	I, T, U																																																		
5	Molecular Orbital Theory	2	I, T																																																		
6	Acid-Base Chemistry Donor-Acceptor Chemistry	1	I, T, U																																																		
7	Solid State-Structure and Bonding	1	I, T, U																																																		
8	Chemistry of the Main Group Elements	1	I, T																																																		
9	Coordination Chemistry: Structures and Isomers	1	I, T, U																																																		
10	Coordination Chemistry: Reactions and Mechanisms	1	I, T, U																																																		
11	Organometallic Chemistry	1	I, T																																																		
12	Organometallic Reactions and Catalysis	1	I, T																																																		
Examination forms	<table><tr><td>☒ Multiple-choice questions</td><td>☐ Oral examination</td></tr><tr><td>☐ Report</td><td>☒ Written examination</td></tr><tr><td>☐ Presentation</td><td>☐ Others, please specify:</td></tr></table>	☒ Multiple-choice questions	☐ Oral examination	☐ Report	☒ Written examination	☐ Presentation	☐ Others, please specify:																																														
☒ Multiple-choice questions	☐ Oral examination																																																				
☐ Report	☒ Written examination																																																				
☐ Presentation	☐ Others, please specify:																																																				

	☐ Assignments
Other requirements	<u>Attendance:</u> 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. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.
Reading list	I. Textbooks [1] Gary L. Miessler, Paul J. Fisher, Donald A. Tarr, <i>Inorganic Chemistry</i>, 5th Ed., 2014. [2] Catherine E. Housecroft and Alan G. Sharpe, <i>Inorganic Chemistry</i>, 3rd Ed., 2008. II. References

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	5						
	2		3					
	3							
Skills (Level: 1-7)	4						2	
	5							
	6							
Attitudes (Level: 1-5)	7							3
	8							
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	5.0	3.0	0.0	0.0	0.0	2.0	3.0
L,M,H conversion*		H	M				L	M

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Introduction to inorganic chemistry	1,3		- Lecture - Class discussion	[1]. [2].
2.	2	Atomic Structure and Properties	1,2,3	Homework	- Lecture - Class discussion	[1]. [2].
3.	3	Bonding Theories	1,3	Homework	- Lecture - Class discussion	[1]. [2].
4.	4, 5	Symmetry and Group Theory	1,2,3 ,4	Quiz	- Lecture - Class discussion	[1]. [2].
5.	6,7	Molecular Orbital Theory	1,3	Homework	- Lecture - Class discussion	[1]. [2].
6.	8	Acid-Base Chemistry Donor-Acceptor Chemistry	1,2,3 ,4	Homework	- Lecture - Class discussion	[1]. [2].
7.	9	Midterm				
8.	10	Solid State-Structure and Bonding	1,3	Homework	- Lecture - Class discussion	[1]. [2].
9.	11	Chemistry of the Main Group Elements	1,3	Homework	- Lecture - Class discussion	[1]. [2].
10.	12	Coordination Chemistry: Structures and Isomers	1,3	Homework	- Lecture - Class discussion	[1]. [2].
11.	13	Coordination Chemistry: Reactions and Mechanisms	1,3,4	Quiz	- Lecture - Class discussion	[1]. [2].
12.	14	Organometallic Chemistry	1,3,4	Homework	- Lecture - Class discussion	[1]. [2].
13.	15	Organometallic Reactions and Catalysis	1,2,3 ,4	Homework	- Lecture - Class discussion	[1]. [2].
14.	16	Presentation	1,2,3 ,4		Oral presentation	
15.	17	Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
In-class exercises/quizzes (10%)	Qz 60%Pass	Qz 60%Pass		Qz 60%Pass
Homework exercises (20%)	HW 50%Pass		HW, HW, HW 50%Pass	
Midterm exam (30%)	Q1 50%Pass	Q2 50%Pass	Q3 50%Pass	
Final exam (40%)	Part I 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): No

6. Revision Date: May 20, 2023

Ho Chi Minh City, 20/5/2023

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	An ability to identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	An ability to communicate (in English) effectively with a range of audiences
4	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Inorganic Chemistry Lab

(Thực hành Hóa vô cơ)

Course Code: CHE2104IU

1. General information

Course designation	This course is designed for chemical engineering students. The course will introduce students to basic laboratory safety, techniques, and apparatus, and complement the knowledge gained in Inorganic Chemistry lectures. Prior to each lab, students must read the lab manual about the experiment and complete a pre-laboratory report. All students must complete mandatory safety training to participate in the course, which will be provided on the first day of the class. Students are expected to come to each lab on time and be prepared to carry out the day's tasks.	
Teaching schedule	☒ Year 1 ☐ Year 2 ☐ Year 3 ☐ Year 4 ☐ Year 5 ☐ Semester 1 ☒ Semester 2 ☐ Summer	
Person In-Charge	Dr. Phùng Thanh Khoa, ptkhoa@hcmiu.edu.vn	
Language	English	
Relation to curriculum	☐ General ☒ Fundamental ☐ Specialization ☐ Project/Internship/Thesis	☒ Compulsory ☐ Elective
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify: Practical experiment	

Workload			Lecture	Lab	Project	Internship	Thesis				
		Credit		1							
	Contact hours	25	0	25	0	0	0				
	Self-Study hours	30	0	30	0	0	0				
	Total workload	55	0	55	0	0	0				
Credit points	1										
Requirements for taking the course	☐ None ☐ Prerequisite course: <i>(Please specify course ID & course title, if any)</i> ☒ Parallel course: <i>Inorganic Chemistry (CHE2103IU)</i> ☐ Previous course: <i>(Please specify course ID & course title, if any)</i>										
Course objectives	The course provides knowledge and skills for students to: • Use basic apparatus and apply experimental methodologies in the chemistry laboratory setting • Demonstrate safe and proper handling of laboratory equipment and chemicals • provide students with a firm foundation in Inorganic Chemistry laboratory for careers in science and engineering. • Develop skills in collecting and managing data in order to express their results in a precise and reliable quantitative or qualitative form on lab reports. • Be able to apply chemical concepts to draw logical conclusions about the applicability of data to real-world problems. • Be able to calculate physical or chemical quantities germane using collected data to the experiment being performed. Develop teamwork skills that include not only the efficient acquisition of experimental data, but also the awareness of safety in the laboratory setting.										
Course learning outcomes	Upon the successful completion of this course, students will be able to: <table><tr><th>Competency level¹</th><th>Course learning outcome (CLO)</th></tr><tr><td></td><td></td></tr></table>							Competency level ¹	Course learning outcome (CLO)		
Competency level ¹	Course learning outcome (CLO)										

¹ Level of competence according to Bloom's Taxonomy:

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x
Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination
Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x

	Knowledge	CLO1. Identify, formulate, and solve complex chemical engineering problems by applying knowledge in inorganic chemistry Laboratory [Understanding].																														
	Skill	CLO 2. Be able to work effectively on a team, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives [Set]. CLO3. Be able to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions [Guided Response].																														
	Attitude	CLO4. Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts [Responding to Phenomena].																														
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> <u>Weight</u>: lecture session (4.2 hours) <u>Teaching levels</u>: I (Introduce); T (Teach); U (Utilize) <table><tr><th>No.</th><th>Topic</th><th>Weight</th><th>Level</th></tr><tr><td>1</td><td>Orientations</td><td>1</td><td>I, T, U</td></tr><tr><td>2</td><td>Close packing geometry in solid</td><td>1</td><td>I, T, U</td></tr><tr><td>3</td><td>Preparation of laboratory solutions</td><td>1</td><td>I, T, U</td></tr><tr><td>4</td><td>Limit test for chloride & sulfates</td><td>1</td><td>I, T, U</td></tr><tr><td>5</td><td>Preparation of coordination compound, $[\text{Ni}(\text{NH}_3)_6]\text{I}_2$</td><td>1</td><td>I, T, U</td></tr><tr><td>6</td><td>Purification of kitchen salt by re-crystallization method</td><td>1</td><td>I, T, U</td></tr></table>				No.	Topic	Weight	Level	1	Orientations	1	I, T, U	2	Close packing geometry in solid	1	I, T, U	3	Preparation of laboratory solutions	1	I, T, U	4	Limit test for chloride & sulfates	1	I, T, U	5	Preparation of coordination compound, $[\text{Ni}(\text{NH}_3)_6]\text{I}_2$	1	I, T, U	6	Purification of kitchen salt by re-crystallization method	1	I, T, U
No.	Topic	Weight	Level																													
1	Orientations	1	I, T, U																													
2	Close packing geometry in solid	1	I, T, U																													
3	Preparation of laboratory solutions	1	I, T, U																													
4	Limit test for chloride & sulfates	1	I, T, U																													
5	Preparation of coordination compound, $[\text{Ni}(\text{NH}_3)_6]\text{I}_2$	1	I, T, U																													
6	Purification of kitchen salt by re-crystallization method	1	I, T, U																													
Examination forms	☒ Multiple-choice questions ☐ Oral examination ☒ Report ☐ Written examination																															

	☐ Presentation ☐ Others, please specify: ☐ Assignments
Other requirements	<u>Attendance:</u> 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. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.
Reading list	I. Textbooks [1] Phung Thanh Khoa & co-workers, <i>Lab Manual – Inorganic Chemistry</i>, 2021 II. References

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	2						
	2							
	3							
Skills (Level: 1-7)	4				2			
	5					3		
	6							
Attitudes (Level: 1-5)	7							2
	8							
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	2.0	0.0	0.0	2.0	3.0	0.0	2.0
L,M,H conversion*		L			L	M		L

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Orientations	1,4		- Lecture	[1].
2.	2	Close packing geometry in solid	1,2,3,4	Group assignment, Lab report	- Lecture - Practice	[1].
3.	3	Preparation of laboratory solutions	1,2,3,4	Group assignment, Lab report	- Lecture - Practice	[1].
4.	4	Limit test for chloride & sulfates	1,2,3,4	Group assignment, Lab report	- Lecture - Practice	[1].
5.	5	Preparation of coordination compound, $[\text{Ni}(\text{NH}_3)_6]\text{I}_2$	1,2,3,4	Group assignment, Lab report	- Lecture - Practice	[1].
6.	6	Purification of kitchen salt by re-crystallization method	1,2,3,4	Group assignment, Lab report	- Lecture - Practice	[1].
7.	6	Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
In-class exercises/Pre-Lab (10%)	Pre-Lab 60% Pass	Pre-Lab 60% Pass	Pre-Lab 60% Pass	Pre-Lab 60% Pass
Lab report (60%)	Lab report 50% Pass	Lab report 50% Pass	Lab report 50% Pass	Lab report 50% Pass
Final exam (30%)	Part I 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): No

6. Revision Date: May 20, 2023

Ho Chi Minh City, 20/5/2023

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



**VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY**
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Organic chemistry 1

(Hóa Hữu cơ 1)

Course Code: CHE1081IU

1. General information

Course designation	This course is specifically designed for students of Chemical Engineering. It is the first part of 2-semester course in Organic Chemistry. This particular module provides fundamental information on aspects of stereochemistry and the basics of addition, substitution and elimination reactions, functional groups, saturated and aromatic heterocyclic compounds.	
Teaching schedule	☐ Year 1 ☒ Year 2 ☐ Year 3 ☒ Year 4 ☐ Year 5 ☒ Semester 1 ☐ Semester 2 ☐ Summer	
Person In-Charge	Dr. Le Quang Phong, lqphong@hcmiu.edu.vn Template: (Name in Vietnamese order), (Email)	
Language	English	
Relation to curriculum	☐ General ☒ Fundamental ☐ Specialization ☐ Project/Internship/Thesis	☒ Compulsory ☐ Elective
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify:	

Workload			Lecture	Lab	Project	Internship	Thesis												
		<i>Credit</i>	3																
	Contact hours	37.5	37.5	0	0	0	0												
	Self-Study hours	90	90	0	0	0	0												
	Total workload	127.5	127.5	0	0	0	0												
Credit points	3																		
Requirements for taking the course	☐ None ☐ Prerequisite course: <i>(Please specify course ID & course title, if any)</i> ☐ Parallel course: ☒ Previous course: Chemistry for Engineers CHE011IU																		
Course objectives	Students will be provided with skills of recognizing different type of functional groups and reactions. Students will be provided with ability of analyzing and drawing reaction mechanism.																		
Course learning outcomes	Upon the successful completion of this course, students will be able to: <table border="1" style="width: 100%;"> <thead> <tr> <th>Competency level</th> <th>Course learning outcome (CLO)</th> </tr> </thead> <tbody> <tr> <td>Knowledge</td> <td>CLO1. Understand organic and hydrocarbon compound structures, their properties, and reactions.[2]</td> </tr> <tr> <td>Skill</td> <td>CLO2. Know how to distinguish chiral and achiral compounds.[3] CLO3. Know how to draw a reaction mechanism.[3]</td> </tr> <tr> <td>Attitude</td> <td>CLO4. Able to predict products of hydrocarbons, alkyl halide and aromatic compounds reactions. [3] CLO5. Able to characterize and determine the organic compounds structures.[3]</td> </tr> </tbody> </table>							Competency level	Course learning outcome (CLO)	Knowledge	CLO1. Understand organic and hydrocarbon compound structures, their properties, and reactions.[2]	Skill	CLO2. Know how to distinguish chiral and achiral compounds.[3] CLO3. Know how to draw a reaction mechanism.[3]	Attitude	CLO4. Able to predict products of hydrocarbons, alkyl halide and aromatic compounds reactions. [3] CLO5. Able to characterize and determine the organic compounds structures.[3]				
Competency level	Course learning outcome (CLO)																		
Knowledge	CLO1. Understand organic and hydrocarbon compound structures, their properties, and reactions.[2]																		
Skill	CLO2. Know how to distinguish chiral and achiral compounds.[3] CLO3. Know how to draw a reaction mechanism.[3]																		
Attitude	CLO4. Able to predict products of hydrocarbons, alkyl halide and aromatic compounds reactions. [3] CLO5. Able to characterize and determine the organic compounds structures.[3]																		
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> <u>Weight</u>: lecture session (2.5 hours) <u>Teaching levels</u>: I (Introduce); T (Teach); U (Utilize) <table border="1" style="width: 100%;"> <thead> <tr> <th>No.</th> <th>Topic</th> <th>Weight</th> <th>Level</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Bonding and molecular structure</td> <td>2</td> <td>T, I</td> </tr> <tr> <td>2</td> <td>Introduction to organic compounds</td> <td>1</td> <td>T, I</td> </tr> </tbody> </table>							No.	Topic	Weight	Level	1	Bonding and molecular structure	2	T, I	2	Introduction to organic compounds	1	T, I
No.	Topic	Weight	Level																
1	Bonding and molecular structure	2	T, I																
2	Introduction to organic compounds	1	T, I																

	3	Stereochemistry	1	T, U
	4	Types of organic reactions	1	T, I
	5	Alkanes and Cycloalkanes	1	T, U
	6	Alkenes	2	T, U
	7	Alkynes	1	T, U
	8	Alkyl halides	3	T, U
	9	Diels and Aromatic compounds	3	T, U
Examination forms	☒ Multiple-choice questions ☐ Oral examination ☐ Report ☒ Written examination ☐ Presentation ☐ Others, please specify: ☒ Assignments			
Other requirements	<u>Attendance:</u> 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. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.			
Reading list	I. Textbooks [1] Organic Chemistry, 7th Edition, 2007, John McMurry [2] Organic Chemistry with a Biological Emphasis, LibreTexts Open Access, 2016, Timothy Soderberg [3] Organic Chemistry, 12th Edition, 2016, T.W. Graham Solomons, Craig B. Fryhle, Scott A. Snyder [4] Organic Chemistry, 8th Edition, 2013, L. D. Wade Jr. II. References			

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-5) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	2						
Skills (Level: 1-7)	2	3						
	3						3	
Attitudes (Level: 1-5)	4						3	
	5	3						
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	2.7	0.0	0.0	0.0	0.0	3.0	0.0
L,M,H conversion*		L					M	

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1-2	Lecture 1: Bonding and molecular structure: Lewis structure, Electronegativity and polarity; Resonances; Intermolecular forces (review) Hybridization, Writing organic structures and mechanism. Curved arrows	1	Quiz1, HW1	Lecture, Inclass-Quiz, HW	
2.	3	Lecture 2: Introduction to organic compounds: Hydrocarbons and functional groups Infrared Spectroscopy: Introduction	1, 5	Quiz2, HW2	Lecture, Inclass-Quiz, HW	
3.	4	Lecture 3: Stereochemistry	2	Quiz3, HW3	Lecture, Inclass-Quiz, HW	
4.	5	Lecture 4: Types of organic reactions	1,3	Quiz4, HW4	Lecture, Inclass-Quiz, HW	
5.	6	Lecture 5: Alkanes and Cycloalkanes: Nomenclature and Conformations	1,3,4	Quiz5, HW5	Lecture, Inclass-Quiz, HW	

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
6.	7-8	Lecture 6: Alkenes: Properties and Synthesis; <u>Addition reactions</u> Review	1,3,4	Quiz6, HW6	Lecture, Inclass-Quiz, HW	
7.	9-10	Midterm				
8.	11	Lecture 7: Alkynes: Properties and Synthesis; <u>Addition reactions</u>	1,3,4	Quiz7, HW5	Lecture, Inclass-Quiz, HW	
9.	12-14	Lecture 8: Alkyl halides: <u>Elimination reactions</u> ; <u>Nucleophilic substitutions</u>	1,3,4	Quiz8, HW6	Lecture, Inclass-Quiz, HW	
10.	15-17	Lecture 9: Diels and Aromatic compounds: <u>Conjugated unsaturated systems</u> ; <u>Electrophilic aromatic substitutions</u>	1,3,4	Quiz9, HW7	Lecture, Inclass-Quiz, HW	
11.	18	Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4	CLO5
In-class exercises/quizzes (15%)	80% Pass	80% Pass	80% Pass	80% Pass	80% Pass
Homework exercises (10%)	90% Pass	90% Pass	90% Pass	90% Pass	90% Pass
Midterm exam (35%)	70% Pass	70% Pass	70% Pass	70% Pass	70% 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): No

6. Revision Date: May 20, 2023

Ho Chi Minh City, 20/5/2023

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Organic chemistry 2

(Hóa Hữu cơ 2)

Course Code: CHE1091IU

1. General information

Course designation	This course is specifically designed for students of Chemical Engineering. It is the second part of 2-semester course in Organic Chemistry. This particular module provides fundamental information on functional groups, mechanisms of their common reactions with a biological emphasis.		
Teaching schedule	☐ Year 1 ☒ Year 2 ☐ Year 3 ☐ Year 4 ☐ Year 5 ☐ Semester 1 ☒ Semester 2 ☐ Summer		
Person In-Charge	Dr. Le Quang Phong, lqphong@hcmiu.edu.vn Template: (Name in Vietnamese order), (Email)		
Language	English		
Relation to curriculum	☐ General ☒ Fundamental ☐ Specialization ☐ Project/Internship/Thesis	☒ Compulsory ☐ Elective	
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify:		

Workload			Lecture	Lab	Project	Internship	Thesis																								
		<i>Credit</i>	3																												
	Contact hours	37.5	37.5	0	0	0	0																								
	Self-Study hours	90	90	0	0	0	0																								
	Total workload	127.5	127.5	0	0	0	0																								
Credit points	3																														
Requirements for taking the course	☐ None ☐ Prerequisite course: <i>(Please specify course ID & course title, if any)</i> ☐ Parallel course: ☒ Previous course: Chemistry for Organic Chemistry 1 CHE1081IU																														
Course objectives	Students will be provided with skills of recognizing different type of functional groups and reactions. Students will be provided with ability of analyzing and drawing reaction mechanism.																														
Course learning outcomes	Upon the successful completion of this course, students will be able to: <table border="1" style="width: 100%;"> <tr> <th>Competency level</th> <th>Course learning outcome (CLO)</th> </tr> <tr> <td>Knowledge</td> <td>CLO1. Understand the structures of alcohols, phenols, ethers, aldehydes, ketones, carboxylic acids, amines, enols and enolates and their properties, reactions. [2]</td> </tr> <tr> <td>Skill</td> <td>CLO2. Know how to draw mechanism of the functional groups mentioned in the course. [3]</td> </tr> <tr> <td>Attitude</td> <td>CLO3. Able to predict and explain products of certain reactions. [3]</td> </tr> </table>							Competency level	Course learning outcome (CLO)	Knowledge	CLO1. Understand the structures of alcohols, phenols, ethers, aldehydes, ketones, carboxylic acids, amines, enols and enolates and their properties, reactions. [2]	Skill	CLO2. Know how to draw mechanism of the functional groups mentioned in the course. [3]	Attitude	CLO3. Able to predict and explain products of certain reactions. [3]																
Competency level	Course learning outcome (CLO)																														
Knowledge	CLO1. Understand the structures of alcohols, phenols, ethers, aldehydes, ketones, carboxylic acids, amines, enols and enolates and their properties, reactions. [2]																														
Skill	CLO2. Know how to draw mechanism of the functional groups mentioned in the course. [3]																														
Attitude	CLO3. Able to predict and explain products of certain reactions. [3]																														
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> <u>Weight</u>: lecture session (2.5 hours) <u>Teaching levels</u>: I (Introduce); T (Teach); U (Utilize) <table border="1" style="width: 100%;"> <tr> <th>Topic</th> <th>Weight</th> <th>Level</th> </tr> <tr> <td>Alcohols, Phenols</td> <td>2</td> <td>T, U</td> </tr> <tr> <td>Ethers, Epoxides, Thiols</td> <td>1</td> <td>T, U</td> </tr> <tr> <td>Aldehydes, ketones</td> <td>2</td> <td>T, U</td> </tr> <tr> <td>Carboxylic acids, Carboxylic acids derivatives:</td> <td>3</td> <td>T, U</td> </tr> <tr> <td>Enols and enolates</td> <td>2</td> <td>T, U</td> </tr> <tr> <td>Aldol condensation and Claisen condensation reactions</td> <td>2</td> <td>T, U</td> </tr> <tr> <td>Amine</td> <td>2</td> <td>T, U</td> </tr> </table>							Topic	Weight	Level	Alcohols, Phenols	2	T, U	Ethers, Epoxides, Thiols	1	T, U	Aldehydes, ketones	2	T, U	Carboxylic acids, Carboxylic acids derivatives:	3	T, U	Enols and enolates	2	T, U	Aldol condensation and Claisen condensation reactions	2	T, U	Amine	2	T, U
Topic	Weight	Level																													
Alcohols, Phenols	2	T, U																													
Ethers, Epoxides, Thiols	1	T, U																													
Aldehydes, ketones	2	T, U																													
Carboxylic acids, Carboxylic acids derivatives:	3	T, U																													
Enols and enolates	2	T, U																													
Aldol condensation and Claisen condensation reactions	2	T, U																													
Amine	2	T, U																													

Examination forms	☒ Multiple-choice questions ☐ Oral examination ☐ Report ☒ Written examination ☐ Presentation ☐ Others, please specify: ☒ Assignments
Other requirements	<u>Attendance:</u> 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. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.
Reading list	I. Textbooks [1] Organic Chemistry, 7th Edition, 2007, John McMurry [2] Organic Chemistry with a Biological Emphasis, LibreTexts Open Access, 2016, Timothy Soderberg [3] Organic Chemistry, 12th Edition, 2016, T.W. Graham Solomons, Craig B. Fryhle, Scott A. Snyder [4] Organic Chemistry, 8th Edition, 2013, L. D. Wade Jr. II. References

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-3) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	2						
Skills (Level: 1-7)	2						3	
Attitudes (Level: 1-5)	3						3	
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	2.0	0.0	0.0	0.0	0.0	3.0	0.0
L,M,H conversion*		L					M	

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1-2	Lecture 1 and 2: Alcohols, Phenols: Synthesis and reactions	1,2,3	Quiz1, HW1	Lecture, In class-Quiz, HW	
2.	3	Lecture 3: Ethers, Epoxides, Thiols: Synthesis and reactions	1,2,3	Quiz2, HW2	Lecture, In class-Quiz, HW	
3.	4-5	Lecture 4: Aldehydes, ketones: <u>Nucleophilic carbonyl addition reactions</u> Sugars as intramolecular hemiacetals and hemiketals Glycosidic bonds	1,2,3	Quiz3, HW3	Lecture, In class-Quiz, HW	
4.	6-8	Lecture 5: Carboxylic acids, Carboxylic acids derivatives: <u>Nucleophilic acyl substitution</u> Nucleophilic acyl substitution in the context of metabolism	1,2,3	Quiz4, HW4	Lecture, In class-Quiz, HW	
5.	9-10	Midterm				
6.	11-12	Lecture 6: Enols and enolates: <u>Reaction at the α Carbon of carbonyl compounds</u>	2,3	Quiz5, HW5	Lecture, In class-Quiz, HW	
7.	13-14	Lecture 7: Aldol condensation and Claisen condensation reactions. Biochemical aldol addition. Decarboxylation and fatty acid metabolism. Biochemical Claisen condensation reactions. Biotin-dependent carboxylation	2,3	Quiz6, HW6	Lecture, In class-Quiz, HW	
8.	15-16	Lecture 8: Amine: Synthesis and reactions	1,2,3	Quiz7, HW7	Lecture, In class-Quiz, HW	
9.	17	Final exam : Review	2,3	Quiz8	Review-Test	
10.	18-19	Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3
In-class exercises/quizzes (15%)	80% Pass	80% Pass	80% Pass
Homework exercises (10%)	90% Pass	90% Pass	90% Pass
Midterm exam (35%)	70% Pass	70% Pass	70% 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): No

6. Revision Date: May 20, 2023

Ho Chi Minh City, 20/5/2023

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Analytical Chemistry 1

(Hóa Phân tích 1)

Course Code: CHE1051IU

1. General information

Course designation	This course covers the basic principles of chemical analysis with the focus on traditional techniques.																																								
Teaching schedule	☐ Year 1 ☒ Year 2 ☐ Year 3 ☐ Year 4 ☐ Year 5 ☐ Semester 1 ☒ Semester 2 ☐ Summer																																								
Person In-Charge	Dr. Nguyen Thao Trang, nttrang@hcmiu.edu.vn Template: (Name in Vietnamese order), (Email)																																								
Language	English																																								
Relation to curriculum	☐ General ☒ Fundamental ☐ Specialization ☐ Project/Internship/Thesis			☒ Compulsory ☐ Elective																																					
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify:																																								
Workload	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th><th></th><th>Lecture</th><th>Lab</th><th>Project</th><th>Internship</th><th>Thesis</th></tr> </thead> <tbody> <tr> <td></td><td><i>Credit</i></td><td>3</td><td></td><td></td><td></td><td></td></tr> <tr> <td>Contact hours</td><td>37.5</td><td>37.5</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td>Self-Study hours</td><td>90</td><td>90</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td>Total workload</td><td>127.5</td><td>127.5</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> </tbody> </table>								Lecture	Lab	Project	Internship	Thesis		<i>Credit</i>	3					Contact hours	37.5	37.5	0	0	0	0	Self-Study hours	90	90	0	0	0	0	Total workload	127.5	127.5	0	0	0	0
		Lecture	Lab	Project	Internship	Thesis																																			
	<i>Credit</i>	3																																							
Contact hours	37.5	37.5	0	0	0	0																																			
Self-Study hours	90	90	0	0	0	0																																			
Total workload	127.5	127.5	0	0	0	0																																			
Credit points	3																																								

Requirements for taking the course	☐ None ☐ Prerequisite course: <i>(Please specify course ID & course title, if any)</i> ☐ Parallel course: <i>(Please specify course ID & course title, if any)</i> ☒ Previous course: Chemistry for Engineers CH011IU; Chemistry Laboratory CH012IU												
Course objectives	The students will be provided with the ranges and uses of classical analytical methods in qualitative and quantitative analysis and also with statistical methods in assessment of analytical measurement data quality and interpretation of their significance, validation of analytical methods and results. Students will develop skills in analysis tasks, critical thinking and problem-solving skills. Student will understand the professional and safety responsibilities residing in working on chemical analysis.												
Course learning outcomes	Upon the successful completion of this course, students will be able to: <table border="1"> <thead> <tr> <th>Competency level</th><th>Course learning outcome (CLO)</th></tr> </thead> <tbody> <tr> <td>Knowledge</td><td> CLO1. Describe the ranges and uses of classical analytical techniques in qualitative and quantitative analysis. [2] CLO2. Explain the principles of the classical analytical techniques.[3] </td></tr> <tr> <td>Skill</td><td>CLO3. Carry out qualitative and quantitative chemical analysis using classical techniques and utilize statistical methods in assessment of measurement data and interpretation of their significance, validation of analytical methods and results.[3]</td></tr> <tr> <td>Attitude</td><td>CLO4. Identify and follow the professional and safety regulation residing in working on chemical analysis.[3]</td></tr> </tbody> </table>	Competency level	Course learning outcome (CLO)	Knowledge	CLO1. Describe the ranges and uses of classical analytical techniques in qualitative and quantitative analysis. [2] CLO2. Explain the principles of the classical analytical techniques.[3]	Skill	CLO3. Carry out qualitative and quantitative chemical analysis using classical techniques and utilize statistical methods in assessment of measurement data and interpretation of their significance, validation of analytical methods and results.[3]	Attitude	CLO4. Identify and follow the professional and safety regulation residing in working on chemical analysis.[3]				
Competency level	Course learning outcome (CLO)												
Knowledge	CLO1. Describe the ranges and uses of classical analytical techniques in qualitative and quantitative analysis. [2] CLO2. Explain the principles of the classical analytical techniques.[3]												
Skill	CLO3. Carry out qualitative and quantitative chemical analysis using classical techniques and utilize statistical methods in assessment of measurement data and interpretation of their significance, validation of analytical methods and results.[3]												
Attitude	CLO4. Identify and follow the professional and safety regulation residing in working on chemical analysis.[3]												
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> <u>Weight</u>: lecture session (2.5 hours) <u>Teaching levels</u>: I (Introduce); T (Teach); U (Utilize) <table border="1"> <thead> <tr> <th>No.</th><th>Topic</th><th>Weight</th><th>Level</th></tr> </thead> <tbody> <tr> <td>1</td><td>Introduction to analytical chemistry</td><td>1</td><td>I, T</td></tr> <tr> <td>2</td><td>Statistics in analytical chemistry</td><td>3</td><td>I, T, U</td></tr> </tbody> </table>	No.	Topic	Weight	Level	1	Introduction to analytical chemistry	1	I, T	2	Statistics in analytical chemistry	3	I, T, U
No.	Topic	Weight	Level										
1	Introduction to analytical chemistry	1	I, T										
2	Statistics in analytical chemistry	3	I, T, U										

	3	Acid-base equilibria, pH, buffer	2	I, T, U
	4	Gravimetric techniques of analysis	1	I, T, U
	5	Titrimetric techniques of analysis	4	I, T, U
	6	Introduction to electrochemistry	1	I, T
	7	Redox titration	1	I, T, U
	8	Potentiometry and Voltammetry	2	I, T
Examination forms	☒ Multiple-choice questions ☐ Oral examination ☐ Report ☒ Written examination ☐ Presentation ☐ Others, please specify: ☒ Assignments			
Other requirements	<u>Attendance:</u> 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. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.			
Reading list	I. Textbooks [1] Douglas A. Skoog, Donald M. West and F. James Holler, Fundamentals of analytical chemistry, Saunders College Publishing, 6th Edition. [2] Daniel Harris, Quantitative chemical analysis. W. H. Freeman and Company, New York, 8th Edition. II. References 			

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	3						
	2	3						
Skills (Level: 1-7)	3			3			3	3
Attitudes (Level: 1-5)	4							3
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	3.0	0.0	3.0	0.0	0.0	3.0	3.0
L,M,H conversion*		M		M			M	M

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Introduction to analytical chemistry Basic tools of analytical chemistry	1, 3	Quiz	- Lecture - Class discussion	
2.	2,3,4	Statistics in analytical chemistry: Errors in chemical analysis, Statistical treatment of errors, Sampling	1, 2	Assignment	- Lecture - Class discussion	
3.	5,6	Acid-base equilibria, pH, buffer	1, 2	Assignment	- Lecture - Class discussion	
4.	7	Gravimetric techniques of analysis	1,2	Assignment	- Lecture - Class discussion	
5.	8	Acid-base titration		Assignment	- Lecture - Class discussion	
6.	9-10	Midterm				
7.	11	Complex acid-base titration	1,2	Assignment	- Lecture - Class discussion	

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
8.	12	Complexometric titration	1,2	Assignment	- Lecture - Class discussion	
9.	13	Precipitate titration	1,2	Assignment	- Lecture - Class discussion	
10.	14	Introduction to Electrochemistry	1,2	Homework	- Lecture - Class discussion	
11.	15	Redox titration	1,2	Homework	- Lecture - Class discussion	
12.	16	Potentiometry and Voltammetry	1,2	Homework	- Lecture - Class discussion	
13.	17	Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3
Homework, Quiz (20%)	Homework 1,2,3, 4 50%Pass	Homework 1, 2, 3, 4 50%Pass	Quiz 50 %Pass
Midterm exam (40%)	Q1, Q2 50%Pass	Q3, Q4 50%Pass	
Final exam (40%)	Q1, Q2 50 % Pass	Q3, Q4 50 % Pass	

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

5. Rubrics (optional): No

6. Revision Date: May 20, 2023

Ho Chi Minh City, 20/5/2023

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Analytical Chemistry 2

(Hóa Phân Tích 2)

Course Code: CHE1061IU

1. General information

Course designation	This course covers the basic principles of chemical analysis with the focus on modern techniques.																																								
Teaching schedule	☐ Year 1 ☐ Year 2 ☒ Year 3 ☐ Year 4 ☐ Year 5 ☒ Semester 1 ☒ Semester 2 ☐ Summer																																								
Person In-Charge	Dr. Nguyen Thao Trang, nttrang@hcmiu.edu.vn Template: (Name in Vietnamese order), (Email)																																								
Language	English																																								
Relation to curriculum	☐ General ☒ Fundamental ☐ Specialization ☐ Project/Internship/Thesis			☒ Compulsory ☐ Elective																																					
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify:																																								
Workload	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th></th><th></th><th>Lecture</th><th>Lab</th><th>Project</th><th>Internship</th><th>Thesis</th></tr> </thead> <tbody> <tr> <td></td><td><i>Credit</i></td><td>3</td><td></td><td></td><td></td><td></td></tr> <tr> <td>Contact hours</td><td>37.5</td><td>37.5</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td>Self-Study hours</td><td>90</td><td>90</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td>Total workload</td><td>127.5</td><td>127.5</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> </tbody> </table>								Lecture	Lab	Project	Internship	Thesis		<i>Credit</i>	3					Contact hours	37.5	37.5	0	0	0	0	Self-Study hours	90	90	0	0	0	0	Total workload	127.5	127.5	0	0	0	0
		Lecture	Lab	Project	Internship	Thesis																																			
	<i>Credit</i>	3																																							
Contact hours	37.5	37.5	0	0	0	0																																			
Self-Study hours	90	90	0	0	0	0																																			
Total workload	127.5	127.5	0	0	0	0																																			
Credit points	3																																								

Requirements for taking the course	☐ None ☐ Prerequisite course: <i>(Please specify course ID & course title, if any)</i> ☐ Parallel course: <i>(Please specify course ID & course title, if any)</i> ☒ Previous course: Analytical Chemistry 1 CHE1051IU														
Course objectives	The students will be provided with the ranges and uses of modern analytical methods in qualitative and quantitative analysis. Techniques used in separation of sample will also be introduced. Students will develop skills in analysis tasks, critical thinking, and problem-solving skills. Student will understand the professional and safety responsibilities residing in working on chemical analysis.														
Course learning outcomes	Upon the successful completion of this course, students will be able to: <table><tr><th>Competency level</th><th colspan="2">Course learning outcome (CLO)</th></tr><tr><td>Knowledge</td><td colspan="2">CLO1. Describe the ranges and uses of modern analytical techniques in qualitative and quantitative analysis.[3] CLO2. Explain the principles of the classical analytical techniques.[3]</td></tr><tr><td>Skill</td><td colspan="2">CLO3. Carry out qualitative and quantitative chemical analysis using modern techniques, utilize statistical methods in assessment of measurement data and interpretation of their significance, validation of analytical methods and results.[3]</td></tr><tr><td>Attitude</td><td colspan="2">CLO4. Be able to understand the professional and safety responsibilities residing in working on chemical analysis.[3]</td></tr></table>			Competency level	Course learning outcome (CLO)		Knowledge	CLO1. Describe the ranges and uses of modern analytical techniques in qualitative and quantitative analysis.[3] CLO2. Explain the principles of the classical analytical techniques.[3]		Skill	CLO3. Carry out qualitative and quantitative chemical analysis using modern techniques, utilize statistical methods in assessment of measurement data and interpretation of their significance, validation of analytical methods and results.[3]		Attitude	CLO4. Be able to understand the professional and safety responsibilities residing in working on chemical analysis.[3]	
Competency level	Course learning outcome (CLO)														
Knowledge	CLO1. Describe the ranges and uses of modern analytical techniques in qualitative and quantitative analysis.[3] CLO2. Explain the principles of the classical analytical techniques.[3]														
Skill	CLO3. Carry out qualitative and quantitative chemical analysis using modern techniques, utilize statistical methods in assessment of measurement data and interpretation of their significance, validation of analytical methods and results.[3]														
Attitude	CLO4. Be able to understand the professional and safety responsibilities residing in working on chemical analysis.[3]														
Content	Measurement principles and electronics	1	I, T												
	Principles of spectroscopic analysis	1	I, T												
	Molecular absorption spectroscopy	3	I, T, U												
	Raman scattering spectroscopy	1	I, T												
	Molecular emission spectroscopy	1	I, T												
	Atomic absorption spectroscopy	1	I, T												
	Chromatography	4	I, T, U												
	Miscellaneous techniques of analysis	3	I, T												

Examination forms	☒ Multiple-choice questions ☐ Oral examination ☐ Report ☒ Written examination ☐ Presentation ☐ Others, please specify: ☒ Assignments
Other requirements	<u>Attendance:</u> 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. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.
Reading list	I. Textbooks [1] Douglas A. Skoog, Donald M. West and F. James Holler, Principles of Instrumental Analysis, Saunders College Publishing, 6th Edition. [2] Daniel Harris, Quantitative chemical analysis. W. H. Freeman and Company, New York, 8th Edition. II. References

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	3						
	2	3						
Skills (Level: 1-7)	3			3			3	3
Attitudes (Level: 1-5)	4							3
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	3.0	0.0	3.0	0.0	0.0	3.0	3.0
L,M,H conversion*		M		M			M	M

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Principles of measurement and electronics	1, 3	Quiz	- Lecture - Class discussion	
2.	2	Principles of spectroscopic techniques	1, 2	Quiz	- Lecture - Class discussion	
3.	3	Absorption of UV-Vis radiation	1, 2	Homework	- Lecture - Class discussion	
4.	4	Absorption of Infrared radiation	1,2	Homework	- Lecture - Class discussion	
5.	5	Fourier Transform Infrared spectroscopy	1,2	Homework	- Lecture - Class discussion	
6.	6	Raman Scattering Spectroscopy	1,2	Homework	- Lecture - Class discussion	
7.	7	Fluorescence Spectroscopy	1,2	Homework	- Lecture - Class discussion	
8.	8	Atomic Absorption Spectroscopy	1,2	Homework	- Lecture - Class discussion	
9.	9-10	Midterm				
10.	11	Introduction to chromatography	1,2	Homework	- Lecture - Class discussion	
11.	12	Gas chromatography	1,2	Homework	- Lecture	

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
					- Class discussion	
12.	13	Liquid chromatography	1,2	Homework	- Lecture - Class discussion	
13.	14-16	Mass spectrometry and other Miscellaneous techniques	1,2	Homework	- Lecture - Class discussion	
14.	17	Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3
Homework, Quiz (20%)	Homework 1,2,3, 4 50%Pass	Homework 1, 2, 3, 4 50%Pass	Quiz 50 %Pass
Midterm exam (40%)	Q1, Q2 50%Pass	Q3, Q4 50%Pass	
Final exam (40%)	Q1, Q2 50 % Pass	Q3, Q4 50 % Pass	

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

5. Rubrics (optional): No

6. Revision Date: May 20, 2023

Ho Chi Minh City, 20/5/2023

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



Course Name: Analytical Chemistry Laboratory

Course Code: CHE1062IU

Course designation	The course will provide students with laboratory skills used in classical and instrumental chemical analysis techniques. Students will also learn how to analyze data, perform statistical analysis, and interpret results.						
Teaching schedule	☐ Year 1 ☐ Year 2 ☒ Year 3 ☐ Year 4 ☐ Year 5						
	☒ Semester 1 ☒ Semester 2 ☐ Summer						
Person In-Charge	Dr. Nguyen Thao Trang, nttrang@hcmiu.edu.vn Template: (Name in Vietnamese order), (Email)						
Language	English						
Relation to curriculum	☐ General ☒ Fundamental ☐ Specialization ☐ Project/Internship/Thesis				☒ Compulsory ☐ Elective		
Teaching methods	☐ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify: Laboratory						
Workload	Self-Study hours	60	0	60	0	0	0
	Total workload	110	0	110	0	0	0

Credit points	2																																			
Requirements for taking the course	☐ None ☐ Prerequisite course: <i>(Please specify course ID & course title, if any)</i> ☒ Parallel course: Analytical Chemistry 2 CHE1061IU ☒ Previous course: Analytical Chemistry 1 CHE1051IU																																			
Course objectives	The students will be familiar with classical and instrumental techniques in chemical analysis. In addition, the students will gain competence in data analysis and preparation of basic laboratory reports and knowledge of laboratory safety and good laboratory practices.																																			
Course learning outcomes	Upon the successful completion of this course, students will be able to: <table border="1" style="width: 100%;"> <thead> <tr> <th>Competency level</th><th colspan="2">Course learning outcome (CLO)</th></tr> </thead> <tbody> <tr> <td>Knowledge</td><td colspan="2">CLO1. Describe the uses of classical and instrumental techniques in chemical analysis.[3] CLO2. Explain the principles of the classical and instrumental techniques in chemical analysis. [3]</td></tr> <tr> <td>Skill</td><td colspan="2">CLO3. Conduct appropriate experiment, analyze and interpret data, and use critical judgment to draw conclusions; to work effectively on a team; and to communicate science effectively both verbal and orally. [3]</td></tr> <tr> <td>Attitude</td><td colspan="2">CLO4. Identify and follow the professional and safety regulation residing in working on chemical analysis.[3]</td></tr> </tbody> </table>			Competency level	Course learning outcome (CLO)		Knowledge	CLO1. Describe the uses of classical and instrumental techniques in chemical analysis.[3] CLO2. Explain the principles of the classical and instrumental techniques in chemical analysis. [3]		Skill	CLO3. Conduct appropriate experiment, analyze and interpret data, and use critical judgment to draw conclusions; to work effectively on a team; and to communicate science effectively both verbal and orally. [3]		Attitude	CLO4. Identify and follow the professional and safety regulation residing in working on chemical analysis.[3]																						
Competency level	Course learning outcome (CLO)																																			
Knowledge	CLO1. Describe the uses of classical and instrumental techniques in chemical analysis.[3] CLO2. Explain the principles of the classical and instrumental techniques in chemical analysis. [3]																																			
Skill	CLO3. Conduct appropriate experiment, analyze and interpret data, and use critical judgment to draw conclusions; to work effectively on a team; and to communicate science effectively both verbal and orally. [3]																																			
Attitude	CLO4. Identify and follow the professional and safety regulation residing in working on chemical analysis.[3]																																			
Content	<table border="1" style="width: 100%;"> <tbody> <tr><td>Orientation</td><td>1</td><td>I, T, U</td></tr> <tr><td>Calibration of Volumetric Glassware</td><td>1</td><td>I, T, U</td></tr> <tr><td>Gravimetric analysis</td><td>1</td><td>I, T, U</td></tr> <tr><td>Acid-base titration</td><td>1</td><td>I, T, U</td></tr> <tr><td>Buffer preparation. Buffer capacity</td><td>1</td><td>I, T, U</td></tr> <tr><td>EDTA titration</td><td>1</td><td>I, T, U</td></tr> <tr><td>Redox titration</td><td>1</td><td>I, T, U</td></tr> <tr><td>Precipitation titration</td><td>1</td><td>I, T, U</td></tr> <tr><td>Spectrophotometric analysis</td><td>2</td><td>I, T, U</td></tr> <tr><td>Thin Layer Chromatography</td><td>1</td><td>I, T, U</td></tr> <tr><td>High-Performance Liquid Chromatography</td><td>1</td><td>I, T, U</td></tr> </tbody> </table>			Orientation	1	I, T, U	Calibration of Volumetric Glassware	1	I, T, U	Gravimetric analysis	1	I, T, U	Acid-base titration	1	I, T, U	Buffer preparation. Buffer capacity	1	I, T, U	EDTA titration	1	I, T, U	Redox titration	1	I, T, U	Precipitation titration	1	I, T, U	Spectrophotometric analysis	2	I, T, U	Thin Layer Chromatography	1	I, T, U	High-Performance Liquid Chromatography	1	I, T, U
Orientation	1	I, T, U																																		
Calibration of Volumetric Glassware	1	I, T, U																																		
Gravimetric analysis	1	I, T, U																																		
Acid-base titration	1	I, T, U																																		
Buffer preparation. Buffer capacity	1	I, T, U																																		
EDTA titration	1	I, T, U																																		
Redox titration	1	I, T, U																																		
Precipitation titration	1	I, T, U																																		
Spectrophotometric analysis	2	I, T, U																																		
Thin Layer Chromatography	1	I, T, U																																		
High-Performance Liquid Chromatography	1	I, T, U																																		
Examination forms	☒ Multiple-choice questions ☒ Report ☐ Presentation ☐ Assignments ☐ Oral examination ☒ Written examination ☐ Others, please specify:																																			

Other requirements	<u>Attendance:</u> An attendance of 100 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.
Reading list	I. Textbooks [1] Daniel Harris, Quantitative chemical analysis (experiments). W. H. Freeman and Company, New York, 8th Edition. II. References

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	3	▼					
	2	3						
Skills (Level: 1-7)	3			3	3	3	3	3
Attitudes (Level: 1-5)	4							3
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	3.0	0.0	3.0	3.0	3.0	3.0	3.0
L,M,H conversion*		M		M	M	M	M	M

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Orientation	1, 3		- Lecture - Class discussion	
2.	2	Calibration of Volumetric Glassware	1, 2, 3	Quiz, Report	- Lecture - Laboratory	
3.	4	Gravimetric determination of Iron as Fe ₂ O ₃	1, 2, 3	Quiz, Report	- Lecture - Laboratory	

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
4.	5	Standardization of NaOH. Titration of acetic acid with standardized NaOH	1,2, 3	Quiz, Report	- Lecture - Laboratory	
5.	6	Buffer preparation. Buffer capacity	1,2, 3	Quiz, Report	- Lecture - Laboratory	
6.	7	EDTA titration of Ca^{2+} and Mg^{2+} in Natural Waters	1,2, 3	Quiz, Report	- Lecture - Laboratory	
7.	8	Iodimetric Titration of Vitamin C	1,2, 3	Quiz, Report	- Lecture - Laboratory	
8.	9-10	Precipitation titration of chloride ion	1,2, 3	Quiz, Report	- Lecture - Laboratory	
9.	11	Spectrophotometric quantification of iron	1,2, 3	Quiz, Report	- Lecture - Laboratory	
10.	12	Spectrophotometric analysis of a mixture	1,2, 3	Quiz, Report	- Lecture - Laboratory	
11.	13	Separation of pigments from vegetables with Thin Layer Chromatography	1,2, 3	Quiz, Report	- Lecture - Laboratory	
12.	14-16	Analysis of vitamin C by High-Performance Liquid Chromatography	1,2, 3	Quiz, Report	- Lecture - Laboratory	
13.	17	Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3
Quiz (20%), Report (50%)	Quiz Report 50%Pass	Quiz Report 50%Pass	
Final exam (30%)	Quiz Q1, Q2 50 % Pass	Quiz Q1, Q2 50 % Pass	Quiz 50 % Pass

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

5. Rubrics (optional): No

6. Revision Date: May 20, 2023

Ho Chi Minh City, 20/5/2023

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



Course Name: Organic Chemistry Laboratory

Course Code: CHE1092IU

Course designation	The course will provide students with laboratory skills used in classical and instrumental chemical analysis techniques. Students will also learn how to analyze data, perform statistical analysis, and interpret results.						
Teaching schedule	☐ Year 1 ☒ Year 2 ☐ Year 3 ☐ Year 4 ☐ Year 5						
	☐ Semester 1 ☒ Semester 2 ☐ Summer						
Person In-Charge	Dr. Le Quang Phong, lqphong@hcmiu.edu.vn Template: (Name in Vietnamese order), (Email)						
Language	English						
Relation to curriculum	☐ General ☒ Fundamental ☐ Specialization ☐ Project/Internship/Thesis				☒ Compulsory ☐ Elective		
Teaching methods	☐ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify: Laboratory						
Workload	Self-Study hours	60	0	60	0	0	0
	Total workload	110	0	110	0	0	0

Credit points	2		
Requirements for taking the course	☐ None ☐ Prerequisite course: <i>(Please specify course ID & course title, if any)</i> ☒ Parallel course: Organic Chemistry 2 CHE1091IU ☒ Previous course: Organic Chemistry 1 CHE1081IU		
Course objectives	The organic chemistry laboratory course introduces the student to fundamental techniques and procedures in extraction, purification, synthesis and characterization of organic compounds and simple reactions used in the organic chemistry laboratory. In addition, the student will be trained in the proper way to write a scientific laboratory report.		
Course learning outcomes	Upon the successful completion of this course, students will be able to:		
	Competency level	Course learning outcome (CLO)	
	Knowledge	CLO1. Utilize basic knowledge gained from General Chemistry course to perform common calculations, including mass balance, limiting reagent, and percent yield. CLO2. Engage in safe laboratory practices by handling laboratory glassware, equipment, and chemical reagents appropriately, using general guidelines and basic knowledge about the common hazards associated with them in an organic chemistry laboratory. CLO3. Predict the outcome of several common organic reaction types through a basic understanding of starting materials, functional groups, mechanism, and typical reaction conditions. Characterize prepared substances by physical/spectroscopic means.	
	Skill	CLO4. Develop laboratory skills in handling chemical, assembling glassware and performing the following techniques as a part of synthetic procedures: distillation, reflux, separation, isolation, and crystallization.	
	Attitude	CLO5. Ability to analyze, predict, and explain many aspects of everyday life using laboratory skills and organic chemistry concepts.	
Content	Laboratory safety	1	I, T, U
	Simple distillation of a single solution	1	I, T, U
	Distillation of a mixture of two liquids	1	I, T, U
	Recrystallization	1	I, T, U
	Extraction	1	I, T, U
	Melting point	1	I, T, U
	Synthesis of aspirin	1	I, T, U

	Nucleophilic substitution reaction of alkyl halides	1	I, T, U
	Oxidation of benzaldehyde-Green chemistry	2	I, T, U
	Qualitative organic analysis	1	I, T, U
Examination forms	☒ Multiple-choice questions ☐ Oral examination ☒ Report ☒ Written examination ☐ Presentation ☐ Others, please specify: ☐ Assignments		
Other requirements	<u>Attendance:</u> An attendance of 100 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.		
Reading list	I. Textbooks [1] Daniel Harris, Quantitative chemical analysis (experiments). W. H. Freeman and Company, New York, 8th Edition. [2] Organic chemistry laboratory manual- Department of Applied Chemistry II. References		

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-5) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	1				2		
	2							2
	3						3	
Skills (Level: 1-7)	4					3		
Attitudes (Level: 1-5)	5							3
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	1,0	0,0	0,0	0,0	2,5	3,0	2,5
L,M,H conversion*		L				L	M	L

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1	1	Orientation	2		- Lecture - Class discussion	
2	2	Simple distillation of a single solution	1,2,4	Quiz, Report	- Lecture - Laboratory	
3	3	Distillation of a mixture of two liquids	1,2,4	Quiz, Report	- Lecture - Laboratory	
4	4	Recrystallization	1,2,4	Quiz, Report	- Lecture - Laboratory	
5	5	Extraction	1,2,4	Quiz, Report	- Lecture - Laboratory	
6	6	Melting point	1,2,4	Quiz, Report	- Lecture - Laboratory	
7	7	Synthesis of aspirin	1,2,3, 4,5	Quiz, Report	- Lecture - Laboratory	
8	8	Nucleophilic substitution reaction of alkyl halides	1,2,3, 4,5	Quiz, Report	- Lecture - Laboratory	
9	9	Oxidation of benzaldehyde-Green chemistry	1,2,3, 4,5	Quiz, Report	- Lecture - Laboratory	
10	10	Qualitative organic analysis	1,2,5	Quiz, Report	- Lecture - Laboratory	
11	11	Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3
Quiz (20%), Report (50%)	Quiz Report 50%Pass	Quiz Report 50%Pass	
Final exam (30%)	Quiz Q1, Q2 50 % Pass	Quiz Q1, Q2 50 % Pass	Quiz 50 % Pass

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

5. Rubrics (optional): No

6. Revision Date: May 20, 2023

Ho Chi Minh City, 20/5/2023

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: PHYSICAL CHEMISTRY 1

(Hóa Lý 1)

Course Code: CHE1031IU

1. General information

Course designation	The course is designed for chemical engineering students and others. The course provides the students with the necessary background in chemical engineering thermodynamics which includes thermodynamics, chemical equilibrium, and phase equilibrium. The knowledge in this course will be further elaborated on in the other fundamental courses as well as specialized courses in the chemical engineering program. The course includes two sections: • Thermodynamics: (i) Concepts and properties of pure substances (ii) the first law of thermodynamics, (iii) the second law of thermodynamics (iv) Thermodynamic cycles and (v) Application of thermodynamic laws in chemical reaction systems. • Chemical and phase equilibrium: (vi) Chemical equilibrium, (vii) Theory of phase equilibrium and phase equilibrium of single component systems (viii) Liquid – vapor and liquid – liquid equilibrium (ix) Liquid – solid equilibrium <i>Môn học này được thiết kế dành cho sinh viên ngành kỹ thuật hóa học và những người khác quan tâm. Khóa học cung cấp cho sinh viên kiến thức căn bản về nhiệt động học kỹ thuật hóa học bao gồm nhiệt động học, cân bằng hóa học và cân bằng pha. Kiến thức trong khóa học này sẽ được phát triển thêm trong các khóa học cơ bản khác cũng như các khóa học chuyên ngành trong chương trình kỹ thuật hóa học.</i> <i>Khóa học bao gồm hai phần:</i> • <i>Nhiệt động học: (i) Khái niệm và thuộc tính của chất tinh khiết (ii) Định luật nhiệt động học thứ nhất, (iii) Định luật nhiệt động học thứ hai (iv) Chu trình nhiệt động và (v) Ứng dụng của luật nhiệt động học trong hệ thống phản ứng hóa học.</i> • <i>Cân bằng hóa học và cân bằng pha: (vi) Cân bằng hóa học, (vii) Lý thuyết cân bằng pha và cân bằng pha của hệ thống một thành phần (viii) Cân bằng lỏng - hơi và cân bằng lỏng - lỏng (ix) Cân bằng lỏng - rắn.</i>

Teaching schedule	☐ Year 1 ☒ Year 2 ☐ Year 3 ☐ Year 4 ☐ Year 5																																								
	☐ Semester 1 ☒ Semester 2 ☐ Summer																																								
Person In-Charge	Dr. Doan Hoai Linh, dhlinh@hcmiu.edu.vn Template: (Name in Vietnamese order), (Email)																																								
Language	English																																								
Relation to curriculum	☐ General ☐ Fundamental ☐ Specialization ☐ Project/Internship/Thesis			☒ Compulsory ☐ Elective																																					
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify:																																								
Workload	<table border="1"> <thead> <tr> <th></th> <th></th> <th>Lecture</th> <th>Lab</th> <th>Project</th> <th>Internship</th> <th>Thesis</th> </tr> </thead> <tbody> <tr> <td></td> <td><i>Credit</i></td> <td>3</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Contact hours</td> <td>37.5</td> <td>37.5</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>Self-Study hours</td> <td>90</td> <td>90</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>Total workload</td> <td>127.5</td> <td>127.5</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> </tr> </tbody> </table>								Lecture	Lab	Project	Internship	Thesis		<i>Credit</i>	3					Contact hours	37.5	37.5	0	0	0	0	Self-Study hours	90	90	0	0	0	0	Total workload	127.5	127.5	0	0	0	0
		Lecture	Lab	Project	Internship	Thesis																																			
	<i>Credit</i>	3																																							
Contact hours	37.5	37.5	0	0	0	0																																			
Self-Study hours	90	90	0	0	0	0																																			
Total workload	127.5	127.5	0	0	0	0																																			
Credit points	3																																								
Requirements for taking the course	☒ None ☐ Prerequisite course: <i>(Please specify course ID & course title, if any)</i> ☐ Parallel course: <i>(Please specify course ID & course title, if any)</i> ☐ Previous course: <i>(Please specify course ID & course title, if any)</i>																																								
Course objectives	Students know how to apply: fundamental knowledge of mathematics to thermochemistry, thermodynamic laws to industrial processes. Students know how to demonstrate all basic thermodynamic processes. Students know how to calculate: all fundamental thermodynamic variables of cycles, the constant and composition of reaction at equilibrium, all variables related to the equilibrium of phase transfer. Students know how to obtain thermodynamic properties from experiments																																								
Course learning outcomes	Upon the successful completion of this course, students will be able to: <table border="1" style="width: 100%;"> <thead> <tr> <th style="width: 15%;">Competency level</th> <th>Course learning outcome (CLO)</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> </tr> </tbody> </table>						Competency level	Course learning outcome (CLO)																																	
Competency level	Course learning outcome (CLO)																																								

	Knowledge	CLO1. When given a complex thermodynamic problem, able to identify, formulate and solve problems by applying various fundamentals thermodynamic laws																												
	Skill	CLO2. Able to demonstrate basic thermodynamic cycles on P-V and T-S diagrams, calculate thermodynamic parameters of said cycles and determine the equilibrium parameters of chemical reaction systems. CLO3. Able to determine individually and in groups thermodynamic parameters in non-ideal mixtures via experimental data and case studies																												
	Attitude	CLO4. Understanding of professional and ethical responsibility, a recognition of the need for, and an ability to engage in life-long learning																												
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> <u>Weight</u>: lecture session (2.5 hours) <u>Teaching levels</u>: I (Introduce); T (Teach); U (Utilize) <table><tr><th>No.</th><th>Topic</th><th>Weight</th><th>Level</th></tr><tr><td>1</td><td>Concepts and behavior of gases</td><td>1</td><td>I,T,U</td></tr><tr><td>2</td><td>First law of thermodynamics Thermodynamic cycle Thermodynamic functions and fundamental equations Pure substance</td><td>3</td><td>T,U</td></tr><tr><td>3</td><td>Second law of thermodynamics</td><td>3</td><td>T,U</td></tr><tr><td>4</td><td>Chemical equilibria Theory of phase equilibrium and phase equilibrium of single component systems Theory of phase equilibrium and phase equilibrium of two component systems Ideal solutions</td><td>3</td><td>T,U</td></tr><tr><td>5</td><td>Liquid – Vapor equilibrium Liquid – Liquid equilibrium Liquid – Solid equilibrium Non-ideal solutions Peng-Robinson and Soave-Redlich-Kwong equation of state</td><td>2</td><td>T,U</td></tr><tr><td>6</td><td>Applications of thermodynamic laws Excess properties Henry’s constant Activity coefficient and fugacity Henry’s constant Setchenow’s coefficient Obtaining thermodynamics parameters experimentally</td><td>3</td><td>T,U</td></tr></table>		No.	Topic	Weight	Level	1	Concepts and behavior of gases	1	I,T,U	2	First law of thermodynamics Thermodynamic cycle Thermodynamic functions and fundamental equations Pure substance	3	T,U	3	Second law of thermodynamics	3	T,U	4	Chemical equilibria Theory of phase equilibrium and phase equilibrium of single component systems Theory of phase equilibrium and phase equilibrium of two component systems Ideal solutions	3	T,U	5	Liquid – Vapor equilibrium Liquid – Liquid equilibrium Liquid – Solid equilibrium Non-ideal solutions Peng-Robinson and Soave-Redlich-Kwong equation of state	2	T,U	6	Applications of thermodynamic laws Excess properties Henry’s constant Activity coefficient and fugacity Henry’s constant Setchenow’s coefficient Obtaining thermodynamics parameters experimentally	3	T,U
No.	Topic	Weight	Level																											
1	Concepts and behavior of gases	1	I,T,U																											
2	First law of thermodynamics Thermodynamic cycle Thermodynamic functions and fundamental equations Pure substance	3	T,U																											
3	Second law of thermodynamics	3	T,U																											
4	Chemical equilibria Theory of phase equilibrium and phase equilibrium of single component systems Theory of phase equilibrium and phase equilibrium of two component systems Ideal solutions	3	T,U																											
5	Liquid – Vapor equilibrium Liquid – Liquid equilibrium Liquid – Solid equilibrium Non-ideal solutions Peng-Robinson and Soave-Redlich-Kwong equation of state	2	T,U																											
6	Applications of thermodynamic laws Excess properties Henry’s constant Activity coefficient and fugacity Henry’s constant Setchenow’s coefficient Obtaining thermodynamics parameters experimentally	3	T,U																											

Examination forms	☐ Multiple-choice questions ☐ Oral examination ☐ Report ☒ Written examination ☒ Presentation ☐ Others, please specify: ☐ Assignments
Other requirements	<u>Attendance:</u> 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. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.
Reading list	I. Textbooks [1] Cengel, Yunus A., Michael A. Boles, and Mehmet Kanoglu. Thermodynamics: an engineering approach, McGraw-Hill, 2011. [2] Ira N. Levine, Physical chemistry 6th Ed., McGraw - Hill

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	5	2					
Skills (Level: 1-7)	2		3		4			
	3			3	3	5	3	
Attitudes (Level: 1-5)	4							3
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	5.0	2.5	3.0	3.5	5.0	3.0	3.0
L,M,H conversion*		H	L	M	M	H	M	M

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Concepts and behavior of gases Zeroth law of thermodynamics	1,2	Quiz 1	Lecture, Discussion, Inclass-Quiz	[1],[2]

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
2.	2-4	First law of thermodynamics Thermodynamic cycle Thermodynamic functions and fundamental equations Pure substance	1,2	Quiz 2-6	Lecture, Inclass-Quiz	[1],[2]
3.	5-8	Second law of thermodynamics Third law of thermodynamics	1,2	Quiz 7-8	Lecture, Inclass-Quiz	[1],[2]
4.	9	Midterm				
5.	11-13	Chemical equilibria Theory of phase equilibrium and phase equilibrium of single component systems Theory of phase equilibrium and phase equilibrium of two component systems Ideal solutions	3,4	Presentation, Group problems 1	Lecture, Group work, Presentation, assignment, design problems	[1],[2]
6.	13-14	Liquid – Vapor equilibrium Liquid – Liquid equilibrium Liquid – Solid equilibrium Non-ideal solutions Peng-Robinson and Soave-Redlich-Kwong equation of state	3,4	Presentation, Group problems 1	Lecture, Group work, Presentation, assignment, design problems	[1],[2]
7.	15-16	Applications of thermodynamic laws Excess properties Henry's constant Activity coefficient and fugacity Henry's constant Setchenow's coefficient Obtaining thermodynamics parameters experimentally	3,4	Presentation, Group problems 1	Lecture, Group work, Presentation, assignment, design problems	[1],[2]
8.	17	Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
Quiz (10%)	Quiz 1-8 50% pass	Quiz 1-8 50% pass		
Presentation (10%)			Presentation 50% pass	Presentation 50% pass
Group Problems (10%)			Group problems 50% pass	Group problems 50% pass
Midterm Exam (30%)	Q1-5 50% pass	Q1-5 50% pass		
Final Exam (40%)	Q1-8 50% pass	Q1-8 50% pass	Q1-8 50% pass	Q1-8 50% pass

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

5. Rubrics (optional): No

6. Revision Date: May 20, 2023

Ho Chi Minh City, 20/5/2023

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Physical Chemistry 2

(Hóa Lý 2)

Course Code: CHE1043IU

1. General information

Course designation	The course is designed for chemical engineering students providing the students with the necessary background in chemical kinetics, electrochemistry, surface phenomena and catalysis. Also, after 10 weeks for lectures in class, the 5-week part of experiment related to all contents of physical chemistry will be organized at the remaining time																																								
Teaching schedule	☐ Year 1 ☒ Year 2 ☐ Year 3 ☐ Year 4 ☐ Year 5 ☐ Semester 1 ☒ Semester 2 ☐ Summer																																								
Person In-Charge	Dr. Vu Bao Khanh, vbkhanh@hcmiu.edu.vn																																								
Language	English																																								
Relation to curriculum	☐ General ☒ Fundamental ☐ Specialization ☐ Project/Internship/Thesis			☒ Compulsory ☐ Elective																																					
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify:																																								
Workload	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th></th><th></th><th>Lecture</th><th>Lab</th><th>Project</th><th>Internship</th><th>Thesis</th></tr> </thead> <tbody> <tr> <td></td><td><i>Credit</i></td><td>2</td><td></td><td></td><td></td><td></td></tr> <tr> <td>Contact hours</td><td>25</td><td>25</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td>Self-Study hours</td><td>60</td><td>60</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td>Total workload</td><td>85</td><td>85</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> </tbody> </table>								Lecture	Lab	Project	Internship	Thesis		<i>Credit</i>	2					Contact hours	25	25	0	0	0	0	Self-Study hours	60	60	0	0	0	0	Total workload	85	85	0	0	0	0
		Lecture	Lab	Project	Internship	Thesis																																			
	<i>Credit</i>	2																																							
Contact hours	25	25	0	0	0	0																																			
Self-Study hours	60	60	0	0	0	0																																			
Total workload	85	85	0	0	0	0																																			

Credit points	2						
Requirements for taking the course	☐ None ☐ Prerequisite course: ☐ Parallel course: ☒ Previous course: Physical Chemistry 1 (CHE1031IU)						
Course objectives	Students will be provided with skills of knowing to solve kinetic problems using applied mathematics, build an equation of rate reaction, electrochemical system, evaluate the capacity of adsorption from isothermal adsorption equation, can interpret all the surface phenomena using fundamental knowledge of colloid chemistry.						
Course learning outcomes	Upon the successful completion of this course, students will be able to:						
	Competency level ¹	Course learning outcome (CLO)					
	Knowledge	CLO1. Describe and explain fundamental concepts of physical chemistry, including those of chemical kinetics, ideal and non-ideal solutions, electrochemical system, and surface phenomena. [Remember] CLO2. Apply simple physical models to predict properties of chemical systems. [Apply] CLO3. Apply numerical or computational methods to calculate physical properties of chemical systems. [Apply]					
	Skill						
	Attitude	CLO4. Develop critical thinking and problem-solving skills through the application of physical chemistry principles to real-world problems. [Organization]					
¹ Level of competence according to Bloom's Taxonomy:							
	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x
Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination
Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x
Content	The description of the contents should clearly indicate the weighting of the content and the level.						

	<u>Weight</u> : lecture session (2.5 hours) <u>Teaching levels</u> : I (Introduce); T (Teach); U (Utilize)			
	No.	Topic	Weight	Level
	1	Reaction kinetics of simple reaction	1	I, T
	2	Reaction kinetics of complex reaction	2	T, U
	3	Theories of reaction rates	1	T, U
	4	Ideal and non-ideal solutions	2	T
	5	Electrochemical system	2	T, U
	6	Surface phenomena	2	T
	7	Physical chemistry of surface	1	T, U
	8	Effect of curvature on equilibrium variables	1	T, U
	9	Adsorption	0.5	I, T
	10	Heterogeneous catalysis		
Examination forms	☐ Multiple-choice questions ☐ Oral examination ☐ Report ☒ Written examination ☐ Presentation ☐ Others, please specify: ☐ Assignments			
Other requirements	<u>Attendance</u> : 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. <u>Assignments/Examination</u> : Students must have more than 50/100 points overall to pass this course.			
Reading list	I. Textbooks [1] Ira N. Levine, Physical chemistry, McGraw – Hill, 2008. II. References [2] Prof. Dr. G. Ertl, Prof. Dr. H. Knözinger, Prof. Dr. J. Weitkamp, Handbook of Heterogeneous Catalysis, Wiley-VCH, 2008. [3] Christopher M. A. Brett, Ana Maria Oliveira Brett, Electrochemistry: Principles, Methods, And Applications, Oxford University Press, 1993. [4] Margaret Robson Wright, An Introduction to Chemical Kinetics, Wiley-VCH, 2004.			

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	1						
	2	3						
	3	3						
Skills (Level: 1-7)								
Attitudes (Level: 1-5)	4							4
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	2.3	0.0	0.0	0.0	0.0	0.0	4.0
L,M,H conversion*		L						H

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Reaction kinetics of simple reactions	1,2,3	HW	Lecture	
2.	2	Reaction kinetics of complex reactions				
3.	3	Theories of reaction rates	1,2,3	HW	Lecture	
4.	4	Ideal and non-ideal solutions	1,2,3	HW	Lecture	
5.	5	Electrochemical system	1,2,3	HW	Lecture	
6.	6	Surface phenomena		HW	Lecture	
7.	7	Physical chemistry of surface		HW	Lecture	
8.	8	Effect of curvature on equilibrium variables		HW	Lecture	
9.	9-10	Midterm Exam				
10.	11	Adsorption	1,2,3	HW	Lecture	
11.	12	Heterogeneous catalysis	1,2,3	HW	Lecture	
12.	18	Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3
In-class attendance (10%)			
Homework exercises (20%)	>50% pass		
Midterm exam (30%)			>50% pass
Final exam (40%)	>50% pass		

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

5. Rubrics (optional): No

6. Revision Date: May 20, 2023

Ho Chi Minh City, 20/5/2023

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Physical Chemistry 2 Laboratory

(Thực Hành Hóa Lý 2)

Course Code: CHE1044IU

1. General information

Course designation	This course will introduce students to experimental methods in physical chemistry, chemical analysis and the principles and applications of chemical instrumentation. The course will acquaint the student the behavior of real chemical systems, the theory of the chemical phenomenon under observation and the design and methodology of measurement systems to detect the chemical phenomenon.	
Teaching schedule	☐ Year 1 ☒ Year 2 ☐ Year 3 ☐ Year 4 ☐ Year 5 ☐ Semester 1 ☒ Semester 2 ☐ Summer	
Person In-Charge	Dr. Vu Bao Khanh, vbkhanh@hcmiu.edu.vn	
Language	English	
Relation to curriculum	☐ General ☒ Fundamental ☐ Specialization ☐ Project/Internship/Thesis	☒ Compulsory ☐ Elective
Teaching methods	☐ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify: laboratory	

Workload			Lecture	Lab	Project	Internship	Thesis
		<i>Credit</i>	0	1			
	Contact hours	25	0	25	0	0	0
	Self-Study hours	30	0	30	0	0	0
	Total workload	55	0	55	0	0	0
Credit points	1						
Requirements for taking the course	☐ None ☒ Prerequisite course: Physical Chemistry 1 (CHE1031IU) ☒ Parallel course: Physical Chemistry 2 (CHE1044IU) ☐ Previous course:						
Course objectives	The course is designed for chemical engineering students. The laboratory course of physical chemistry 2 introduces the student to fundamental techniques and procedures in performing, observing, collecting, and processing data obtained from experiments including chemical kinetics, surface phenomena, colligative properties, and ideal and non-ideal solutions. In addition, the student will be trained in the proper way to write a scientific laboratory report.						
Course learning outcomes	Upon the successful completion of this course, students will be able to:						
	Competency level¹	Course learning outcome (CLO)					
	Knowledge	CLO1. Acquire knowledge of safety protocols, chemical handling, and hazard identification in the laboratory setting. [Understand] CLO2. Demonstrate an understanding of the theoretical background and concepts related to the experiments conducted in the physical chemistry laboratory. [Apply]					
	Skill	CLO3. Use computational tools and software to process and analyze experimental data, when applicable. [Mechanism] CLO4. Display experimental procedures, results, and conclusions effectively through written reports and oral presentations. [Set] CLO5. Perform laboratory experiments in physical chemistry using proper techniques, equipment, and safety precautions. [Guided response]					

	Attitude	CLO6. Cultivate a responsible and safety-conscious attitude towards laboratory work, adhering to established protocols and practices. [Organization]					
¹ Level of competence according to Bloom’s Taxonomy:							
	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x
Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination
Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i>						
	<u>Weight</u> : lecture session (2.5 hours)						
	<u>Teaching levels</u> : I (Introduce); T (Teach); U (Utilize)						
	No.	Topic				Weight	Level
	1	Experiment 1: Rate law determination of crystal violet hydroxylation				1	U
	2	Experiment 2: pH paradoxes				2	U
	3	Experiment 3: Using freezing point depression to find molecular weight				1	U
	4	Experiment 4: Solubility and miscibility				2	U
Examination forms	Experiment 5: Determination of adsorption isotherm of methylene blue on activated carbon				2	U	
	Final evaluation				2	U	
	☒ Multiple-choice questions ☐ Oral examination						
	☐ Report ☐ Written examination						
	☐ Presentation ☐ Others, please specify:						
	☐ Assignments						
	Other requirements						
	<u>Attendance</u> : 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.						

	<u>Assignments/Examination</u> : Students must have more than 50/100 points overall to pass this course.
Reading list	I. Textbooks Lab manual for physical chemistry 2 (internal use only) II. References

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-5) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1		2					
	2	3						
Skills (Level: 1-7)	3				4	4		
	4				2	2		
	5				3	3		
Attitudes (Level: 1-5)	6							3
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	3.0	2.0	0.0	3.0	3.0	0.0	3.0
L,M,H conversion*		M	L		M	M		M

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Experiment 1: Rate law determination of crystal violet hydroxylation	1,2,3,4	Prelab, report	Experiment	
2.	2	Experiment 2: pH paradoxes	1,2,3,4	Prelab, report	Experiment	
3.	3	Experiment 3: Using freezing point depression to find molecular weight	1,2,3,4	Prelab, report	Experiment	
4.	4	Experiment 4: Solubility and miscibility	1,2,3,4	Prelab, report	Experiment	
5.	5	Experiment 5: Determination of adsorption isotherm of	1,2,3,4	Prelab, report	Experiment	

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
		methylene blue on activated carbon				
6.	6	Final evaluation		Multiple-choice questions		

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
Prelab (10%)				
Lab report (60%)		>50% pass	>50% pass	
Final evaluation (30%)		>50% pass	>50% pass	

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

5. Rubrics (optional): No

6. Revision Date: May 20, 2023

Ho Chi Minh City, 20/5/2023

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



**VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY**
School of Chemical and Environmental Engineering

COURSE SYLLABUS

**Course Name: Biochemistry
(Hóa Sinh)**

Course Code: CHE1104IU

1. General information

Course designation	The course will cover fundamental concepts in biochemistry and an introduction to metabolisms occurring in living organisms in order to understand the molecular basic of life. The course topics will include enzyme kinetics and mechanisms and metabolisms of important biological molecules such as carbohydrates, fatty acids, amino acids with an emphasis on their degradation pathways.	
Teaching schedule	☐ Year 1 ☐ Year 2 ☒ Year 3 ☐ Year 4 ☐ Year 5 ☐ Semester 1 ☒ Semester 2 ☐ Summer	
Person In-Charge	Dr. Nguyen Thao Trang, nttrang@hcmiu.edu.vn Template: (Name in Vietnamese order), (Email)	
Language	English	
Relation to curriculum	☐ General ☒ Fundamental ☐ Specialization ☐ Project/Internship/Thesis	☒ Compulsory ☐ Elective
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify:	

Workload			Lecture	Lab	Project	Internship	Thesis
		<i>Credit</i>	3				
	Contact hours	37.5	37.5	0	0	0	0
	Self-Study hours	90	90	0	0	0	0
	Total workload	127.5	127.5	0	0	0	0
Credit points	3						
Requirements for taking the course	☐ None ☐ Prerequisite course: <i>(Please specify course ID & course title, if any)</i> ☐ Parallel course: Biochemistry Laboratory CHE1105IU ☒ Previous course: Chemistry for Engineers CH011IU; Chemistry Laboratory CH012IU						
Course objectives	The students will be provided fundamental concepts in biochemistry and metabolic pathways occurring in living organisms in order to understand the molecular basic of life. Students will develop skills to communicate effectively scientific knowledge.						
Course learning outcomes	Upon the successful completion of this course, students will be able to:						
	Competency level	Course learning outcome (CLO)					
	Knowledge	CLO1. Describe structures and functions of important biological molecules; explain enzyme kinetics and strategies in enzyme catalyzed reactions; metabolic pathways of important biological molecules including carbohydrates, fatty acids and amino acids [2].					
	Skill	CLO2. Apply the knowledge learned into biochemical situations [3].					
	Attitude	CLO3. Explain the important roles of important biological molecules and the related metabolic pathways to cell activities [3].					
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i>						
	<u>Weight</u> : lecture session (2.5 hours)						
	<u>Teaching levels</u> : I (Introduce); T (Teach); U (Utilize)						
	No.	Topic				Weight	Level

	1	Introduction to important biological molecules: carbohydrates, lipids, amino acids and nucleotides.	1	I, T
	2	Enzymes: Basic Concepts and Kinetics	2	I, T, U
	3	Metabolism: Basic Concepts and Design	1	I, T
	4	Carbohydrate Metabolism	4	I, T, U
	5	The Citric Acid Cycle (CAC)	1	I, T
	6	Electron Transport Chain & Oxidative Phosphorylation	2	I, T
	7	Photosynthesis - The Light Reaction & The Calvin Cycle	1	I, T
	8	Fatty Acid Metabolism	2	I, T
	9	Amino Acid Catabolism	1	I, T
Examination forms	☒ Multiple-choice questions ☐ Oral examination ☐ Report ☒ Written examination ☐ Presentation ☐ Others, please specify: ☒ Assignments			
Other requirements	<u>Attendance:</u> 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. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.			
Reading list	I. Textbooks [1] Jeremy M. Berg, John L. Tymoczko and Lubert Strayer, <i>Biochemistry</i>, 2010, 7th edition. II. References			

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-3) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	2						
Skills (Level: 1-7)	2			3	3		3	
Attitudes (Level: 1-5)	3							3
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	2.0	0.0	3.0	3.0	0.0	3.0	3.0
L,M,H conversion*		L		M	M		M	M

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Introduction to important biological molecules: carbohydrates, lipids, amino acids and nucleotides.	1, 3	Quiz	- Lecture - Class discussion	
2.	2, 3	Enzymes: Basic Concepts and Kinetics	1, 2	Assignment	- Lecture - Class discussion	
3.	4	Metabolism: Basic Concepts & Design	1, 2	Quiz	- Lecture - Class discussion	
4.	5, 6	Carbohydrate Metabolism: Glycolysis- Gluconeogenesis	1,2	Quiz	- Lecture - Class discussion	
5.	7	The Citric Acid Cycle (CAC)	1,2	Quiz	- Lecture - Class discussion	
6.	8	Electron Transport Chain & Oxidative Phosphorylation	1,2	Quiz	- Lecture - Class discussion	
7.	9-10	Midterm				
8.	11, 12	Carbohydrate Metabolism: Pentose phosphate pathway	1,2	Quiz	- Lecture - Class discussion	

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
		(PPP)-Glycogen metabolism				
9.	13	Photosynthesis - The Light Reaction & The Calvin Cycle		Quiz		
10.	14, 15	Fatty Acid Metabolism	1,2	Homework	- Lecture - Class discussion	
11.	16	Amino Acid Catabolism	1,2	Quiz	- Lecture - Class discussion	
12.	17	Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3
Homework, Quiz (20%)	Quiz Homework 1,2 50%Pass	Quiz Homework 1, 2 50%Pass	Quiz 50 %Pass
Midterm exam (40%)	Quiz, Q1, Q2 50%Pass	Quiz Q3 50%Pass	
Final exam (40%)	Quiz Q1, Q2 50 % Pass	Quiz Q3 50 % Pass	

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

5. Rubrics (optional): No

6. Revision Date: May 20, 2023

Ho Chi Minh City, 20/5/2023

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: **Biochemistry Laboratory**

(Thực hành Hóa Sinh)

Course Code: CHE1105IU

1. General information

Course designation	The course provides students with laboratory skills in the quantitative analysis of important macromolecules including proteins, carbohydrates, and metal ions as well.	
Teaching schedule	☐ Year 1 ☐ Year 2 ☒ Year 3 ☐ Year 4 ☐ Year 5 ☐ Semester 1 ☒ Semester 2 ☐ Summer	
Person In-Charge	Dr. Nguyen Thao Trang, nttrang@hcmiu.edu.vn Template: (Name in Vietnamese order), (Email)	
Language	English	
Relation to curriculum	☐ General ☒ Fundamental ☐ Specialization ☐ Project/Internship/Thesis	☒ Compulsory ☐ Elective
Teaching methods	☐ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify: Laboratory	

Workload			Lecture	Lab	Project	Internship	Thesis
		Credit		1			
	Contact hours	25		25	0	0	0
	Self-Study hours	30		30	0	0	0
	Total workload	55		55	0	0	0
Credit points	1						
Requirements for taking the course	☐ None ☐ Prerequisite course: <i>(Please specify course ID & course title, if any)</i> ☒ Parallel course: Biochemistry CHE1104IU ☒ Previous course: Chemistry for Engineers CH011IU; Chemistry Laboratory CH012IU						
Course objectives	The students will be familiar with quantitative analysis of macromolecules such as proteins, carbohydrates, essential metal ions and investigation the activity of a certain type of enzymes. In addition, the students will gain competence in data analysis and preparation of basic laboratory reports and knowledge of laboratory safety and good laboratory practices.						
Course learning outcomes	Upon the successful completion of this course, students will be able to:						
	Competency level	Course learning outcome (CLO)					
	Knowledge	CLO1. Explain the principles of biochemical techniques in analysis of biological molecules [2].					
	Skill	CLO2. Conduct appropriate experiment, analyze and interpret data, and use critical judgment to draw conclusions; to work effectively on a team; and to communicate science effectively [3].					
	Attitude	CLO3. Follow safety regulations in working in chemistry/biology laboratory [3].					
Content	The description of the contents should clearly indicate the weighting of the content and the level.						
	Weight: lecture session (2.5 hours)						
	Teaching levels: I (Introduce); T (Teach); U (Utilize)						
	No.	Topic				Weight	Level
	1	Orientation				1	I, T
2	Determination of protein solution by Lowry method				1	I, T, U	
3	Investigation of the enzymatic activity of bromelain				1	I, T, U	

	4	Determination of amino acid components by paper chromatography and electrophoresis	1	I, T, U
	5	Quantitative determination of soluble carbohydrates by spectrophotometer	1	I, T, U
	6	Quantitative determination of calcium	1	I, T, U
Examination forms	☒ Multiple-choice questions ☐ Oral examination ☒ Report ☒ Written examination ☐ Presentation ☐ Others, please specify: ☐ Assignments			
Other requirements	Attendance: An attendance of 100 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] Biochemistry Laboratory Manual [2] Jeremy M. Berg, John L. Tymoczko and Lubert Strayer, <i>Biochemistry</i>, 2010, 7th edition.			

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-3) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	2	2					
Skills (Level: 1-7)	2			3	3	3		
Attitudes (Level: 1-5)	3							3
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	2.0	2.0	3.0	3.0	3.0	0.0	3.0
L,M,H conversion*		L	L	M	M	M		M

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Orientation	1, 3		- Lecture	
2.	2	Determination of protein solution by Lowry method	1, 2, 3	Quiz, Report	- Lecture - Laboratory	
3.	3	Investigation of the enzymatic activity of bromelain	1, 2, 3	Quiz, Report	- Lecture - Laboratory	
4.	4	Determination of amino acid components by paper chromatography and electrophoresis	1,2, 3	Quiz, Report	- Lecture - Laboratory	
5.	5	Quantitative determination of soluble carbohydrates by spectrophotometer	1,2, 3	Quiz, Report	- Lecture - Laboratory	
6.	6	Quantitative determination of calcium	1,2, 3	Quiz, Report	- Lecture - Laboratory	
7.		Exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3
Quiz (20%), Report (50%)	Quiz Report 50%Pass	Quiz Report 50%Pass	
Final exam (30%)	Quiz Q1, Q2 50 % Pass	Quiz Q1, Q2 50 % Pass	Quiz 50 % Pass

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

5. Rubrics (optional): No

6. Revision Date: May 20, 2023

Ho Chi Minh City, 20/5/2023

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Process Instrumentation and Control

(Đo lường và điều khiển quá trình)

Course Code: CHE1021IU

1. General information

Course designation	Process control has a number of significant advantages. The use of process control in a system enables the maximum profitability to be derived. Other advantages are that automatic control results in increased plant flexibility, reduced maintenance, and in stable and safe operation of the plant. In this course, fundamental concepts of control theory as well as practical aspects of process control loops are explained. Theoretical modelling of chemical processes, a necessary step for designing process controller, is introduced with practice exercises. Process instruments that constitute industrial control loops are described. Measurement principles for sensors measuring temperature, pressure, liquid level, flowrate and composition are briefly described with guidance on how to select the proper types of sensors. Practical knowledge for designing and tuning of PID controllers, the most important and most popular type of process controllers, is also provided with illustrated examples.	
Teaching schedule	☐ Year 1 ☒ Year 2 ☐ Year 3 ☐ Year 4 ☐ Year 5	
	☐ Semester 1 ☒ Semester 2 ☐ Summer	
Person In-Charge	Dr. Nguyen Thanh Duy Quang, ntdquang@hcmut.edu.vn	
Language	English	
Relation to curriculum	☐ General ☒ Fundamental ☐ Specialization ☐ Project/Internship/Thesis	☒ Compulsory ☐ Elective

Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify:																																								
Workload	<table border="1"> <tr> <td></td> <td></td> <td>Lecture</td> <td>Lab</td> <td>Project</td> <td>Internship</td> <td>Thesis</td> </tr> <tr> <td></td> <td><i>Credit</i></td> <td>2</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Contact hours</td> <td>25</td> <td>25</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>Self-Study hours</td> <td>60</td> <td>60</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>Total workload</td> <td>85</td> <td>85</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> </tr> </table>								Lecture	Lab	Project	Internship	Thesis		<i>Credit</i>	2					Contact hours	25	25	0	0	0	0	Self-Study hours	60	60	0	0	0	0	Total workload	85	85	0	0	0	0
		Lecture	Lab	Project	Internship	Thesis																																			
	<i>Credit</i>	2																																							
Contact hours	25	25	0	0	0	0																																			
Self-Study hours	60	60	0	0	0	0																																			
Total workload	85	85	0	0	0	0																																			
Credit points	2																																								
Requirements for taking the course	☐ None ☒ Prerequisite course: <i>Introduction to Chemical Engineering (CHE1011IU)</i> ☐ Parallel course: <i>(Please specify course ID & course title, if any)</i> ☐ Previous course: <i>(Please specify course ID & course title, if any)</i>																																								
Course objectives	- Students can describe process instruments that constitute industrial control loops, understand the measurement principles and select the proper types of measurement sensors. - Students can describe the fundamentals of control theory and practical aspects of process control system design - Students can perform dynamic modelling of chemical processes for process control design. - Students can perform the designing and tuning of PID controllers																																								
Course learning outcomes	Upon the successful completion of this course, students will be able to: <table border="1"> <tr> <th>Competency level¹</th> <th>Course learning outcome (CLO)</th> </tr> <tr> <td>Knowledge</td> <td>CLO1. Describe process instruments that constitute industrial control loops, describe the measurement principles and select the proper types of measurement sensors [Analyzing].</td> </tr> </table>						Competency level ¹	Course learning outcome (CLO)	Knowledge	CLO1. Describe process instruments that constitute industrial control loops, describe the measurement principles and select the proper types of measurement sensors [Analyzing].																															
Competency level ¹	Course learning outcome (CLO)																																								
Knowledge	CLO1. Describe process instruments that constitute industrial control loops, describe the measurement principles and select the proper types of measurement sensors [Analyzing].																																								

¹ Level of competence according to Bloom's Taxonomy:

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x
Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination
Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x

		CLO2. Describe the fundamentals of control theory and practical aspects of process control system design [Evaluating].																																												
	Skill	CLO3. Carry out the task of designing and tuning of PID controllers [Complex Overt Response].																																												
	Attitude	CLO4. Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts [Valuing].																																												
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> <u>Weight:</u> lecture session (2.5 hours) <u>Teaching levels:</u> I (Introduce); T (Teach); U (Utilize) <table><tr><th>No.</th><th>Topic</th><th>Weight</th><th>Level</th></tr><tr><td>1</td><td>Introduction to process instrumentation and control</td><td>1</td><td>I, T</td></tr><tr><td>2</td><td>Measurement principles and measurement sensors</td><td>1</td><td>I, T</td></tr><tr><td>3</td><td>Theoretical modelling of chemical processes</td><td>1</td><td>I, T</td></tr><tr><td>4</td><td>Laplace transform and transfer function</td><td>1</td><td>I, T</td></tr><tr><td>5</td><td>Analysis of dynamic behavior of chemical processes</td><td>1</td><td>I, T</td></tr><tr><td>6</td><td>Control system development. Designing process control system</td><td>1</td><td>I, T</td></tr><tr><td>7</td><td>Feedback controller & PID controller</td><td>1</td><td>I, T</td></tr><tr><td>8</td><td>Design and tuning of PID controller</td><td>1</td><td>I, T</td></tr><tr><td>9</td><td>Illustration examples of PID controller design and tuning</td><td>1</td><td>T,U</td></tr><tr><td>10</td><td>Use Aspen Hysys process simulator in process control system design.</td><td>1</td><td>T,U</td></tr></table>		No.	Topic	Weight	Level	1	Introduction to process instrumentation and control	1	I, T	2	Measurement principles and measurement sensors	1	I, T	3	Theoretical modelling of chemical processes	1	I, T	4	Laplace transform and transfer function	1	I, T	5	Analysis of dynamic behavior of chemical processes	1	I, T	6	Control system development. Designing process control system	1	I, T	7	Feedback controller & PID controller	1	I, T	8	Design and tuning of PID controller	1	I, T	9	Illustration examples of PID controller design and tuning	1	T,U	10	Use Aspen Hysys process simulator in process control system design.	1	T,U
No.	Topic	Weight	Level																																											
1	Introduction to process instrumentation and control	1	I, T																																											
2	Measurement principles and measurement sensors	1	I, T																																											
3	Theoretical modelling of chemical processes	1	I, T																																											
4	Laplace transform and transfer function	1	I, T																																											
5	Analysis of dynamic behavior of chemical processes	1	I, T																																											
6	Control system development. Designing process control system	1	I, T																																											
7	Feedback controller & PID controller	1	I, T																																											
8	Design and tuning of PID controller	1	I, T																																											
9	Illustration examples of PID controller design and tuning	1	T,U																																											
10	Use Aspen Hysys process simulator in process control system design.	1	T,U																																											
Examination forms	☐ Multiple-choice questions ☐ Report ☐ Presentation ☐ Assignments ☐ Oral examination ☒ Written examination ☐ Others, please specify:																																													
Other requirements	<u>Attendance:</u> 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. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.																																													
Reading list	I. Textbooks																																													

	[1]. D. Seborg, T. Edgar, D. Mellichamp, F. Doyle III. <i>Process Dynamics and Control</i>, 4th Ed, Wiley, 2017 [2]. Franklyn W. Kirk, Thomas A. Weedon, Philip Kirk. <i>Instrumentation</i>, 5th Ed, American Technical Publishers, Inc, 2010. [3]. Iva'n Dario Gil Chaves et al., <i>Process Analysis and Simulation in Chemical Engineering</i>, Springer International Publishing, Switzerland, 2016 II. References

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	4						
	2	5						
	3							
Skills (Level: 1-7)	4							
	5					5		
	6							
Attitudes (Level: 1-5)	7							3
	8							
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	4.5	0.0	0.0	0.0	5.0	0.0	3.0
L,M,H conversion*		H				H		M

***L (Low); M (Medium); H (High)**

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Introduction to process instrumentation and control	1	Midterm exam	Lecture, Discussion,	[1] [2]
2.	2	Measurement principles and measurement sensors	1	Midterm exam	Lecture, Discussion	[1] [2]
3.	3	Theoretical modelling of chemical processes	2	Midterm exam HW1	Lecture, Discussion, HW	[1]
4.	4	Laplace transform and transfer function	2	Midterm exam HW1	Lecture, Discussion, HW	[1]
5.	5	Analysis of dynamic behavior of chemical processes	2	Midterm exam HW1	Lecture, Discussion, HW	[1]
6.	6	Control system development. Designing process control system	2	Midterm exam HW1	Lecture, Discussion, HW	[1]
7.	7	Feedback controller & PID controller	2,3	Final exam HW2	Lecture, Discussion, HW	[1]
8.	8	Design and tuning of PID controller	3	Final exam HW2	Lecture, Discussion, HW	[1]
9.	9	Midterm				
10.	10	Illustration examples of PID controller design and tuning	3	Final exam HW2	Lecture, Discussion, HW	[1]
11.	11	Use Aspen Hysys process simulator in process control system design.	2,3	HW2	Lecture, Discussion, HW	[1] [3]
12.	12	Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
Homework exercises (30%)		HW1 80% Pass	HW2 80% Pass	
Midterm exam (30%)	Q1 80%Pass	Q2 80% Pass		
Final exam (40%)		Part II.1 80% Pass	Part II.2 80% Pass	Part II.3 80% Pass

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

5. Rubrics (optional): No

6. Revision Date: May 20, 2023

Ho Chi Minh City, 20/5/2023

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	An ability to identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	An ability to communicate (in English) effectively with a range of audiences
4	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Introduction Chemistry

(Hóa học Công nghiệp)

Course Code: CHE1111IU

1. General information

Course designation	This course will provide students with essential skills and knowledge involved in industrial chemistry. The covered topics include homogeneous and heterogeneous catalysis processes, inorganic chemical production processes, surfactants, paints and coatings, Processes in the Oil Refinery, olefins and polymer production processes, introduction to battery.																																								
Teaching schedule	☐ Year 1 ☐ Year 2 ☐ Year 3 ☒ Year 4 ☐ Year 5 ☒ Semester 1 ☐ Semester 2 ☐ Summer																																								
Person In-Charge	Dr. Phung Thanh Khoa, ptkhoa@hcmiu.edu.vn																																								
Language	English																																								
Relation to curriculum	☐ General ☒ Fundamental ☐ Specialization ☐ Project/Internship/Thesis			☒ Compulsory ☐ Elective																																					
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify:																																								
Workload	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th></th><th></th><th>Lecture</th><th>Lab</th><th>Project</th><th>Internship</th><th>Thesis</th></tr> </thead> <tbody> <tr> <td></td><td><i>Credit</i></td><td>2</td><td></td><td></td><td></td><td></td></tr> <tr> <td>Contact hours</td><td>25</td><td>25</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td>Self-Study hours</td><td>60</td><td>60</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td>Total workload</td><td>85</td><td>85</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> </tbody> </table>								Lecture	Lab	Project	Internship	Thesis		<i>Credit</i>	2					Contact hours	25	25	0	0	0	0	Self-Study hours	60	60	0	0	0	0	Total workload	85	85	0	0	0	0
		Lecture	Lab	Project	Internship	Thesis																																			
	<i>Credit</i>	2																																							
Contact hours	25	25	0	0	0	0																																			
Self-Study hours	60	60	0	0	0	0																																			
Total workload	85	85	0	0	0	0																																			

Credit points	2	
Requirements for taking the course	☐ None ☒ Prerequisite course: <i>Reaction Kinetics and Catalysis (CHE2011IU)</i> ☐ Parallel course: <i>(Please specify course ID & course title, if any)</i> ☐ Previous course: <i>(Please specify course ID & course title, if any)</i>	
Course objectives	Upon successful completion of this course, the students should demonstrate knowledge of: • The historical events for industrial chemistry • Basics of oil refinery and key petrochemical unit operations • Homogeneous and heterogeneous catalysis and inorganic chemical production processes. • Polymer production processes. • Basics of surfactants, paints and coatings, and battery	
Course learning outcomes	Upon the successful completion of this course, students will be able to:	
	Competency level ¹	Course learning outcome (CLO)
	Knowledge	CLO1. Be able to understand common commercial industrial chemical processes [Analyzing].
		CLO2. Be able to apply knowledge in industrial chemistry to design chemical processes [Creating].
	Skill	CLO3. Acquire and apply new knowledge as needed, using appropriate learning strategies [Complex Overt Response].
Attitude	CLO4. Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts [Organization].	

¹ Level of competence according to Bloom's Taxonomy:

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x
Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination
Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x

Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> <u>Weight</u>: lecture session (2.5 hours) <u>Teaching levels</u>: I (Introduce); T (Teach); U (Utilize) <table><tr><th>No.</th><th>Topic</th><th>Weight</th><th>Level</th></tr><tr><td>1</td><td>Introduction to Industrial Chemistry</td><td>1</td><td>I, T</td></tr><tr><td>2</td><td>Homogeneous Transition Metal Catalysis in the Production of Bulk Chemicals</td><td>1</td><td>I, T</td></tr><tr><td>3</td><td>Heterogeneous Catalysis – Concepts and Examples</td><td>1</td><td>I, T</td></tr><tr><td>4</td><td>Processes in the Oil Refinery</td><td>1</td><td>I, T</td></tr><tr><td>5</td><td>Production of Light Alkenes + Chemicals and Polymers from Ethylene, Propylene</td><td>1</td><td>I, T</td></tr><tr><td>6</td><td>Edible oils, Fats, Waxes, Soaps and Detergents</td><td>1</td><td>I, T</td></tr><tr><td>7</td><td>The Solvay and Haber-Bosche processes</td><td>1</td><td>I, T</td></tr><tr><td>8</td><td>Paints and Coatings</td><td>1</td><td>I, T</td></tr><tr><td>9</td><td>Introductions to Polymers</td><td>1</td><td>I, T</td></tr><tr><td>10</td><td>Introduction to Battery</td><td>1</td><td>I, T</td></tr></table>				No.	Topic	Weight	Level	1	Introduction to Industrial Chemistry	1	I, T	2	Homogeneous Transition Metal Catalysis in the Production of Bulk Chemicals	1	I, T	3	Heterogeneous Catalysis – Concepts and Examples	1	I, T	4	Processes in the Oil Refinery	1	I, T	5	Production of Light Alkenes + Chemicals and Polymers from Ethylene, Propylene	1	I, T	6	Edible oils, Fats, Waxes, Soaps and Detergents	1	I, T	7	The Solvay and Haber-Bosche processes	1	I, T	8	Paints and Coatings	1	I, T	9	Introductions to Polymers	1	I, T	10	Introduction to Battery	1	I, T
No.	Topic	Weight	Level																																													
1	Introduction to Industrial Chemistry	1	I, T																																													
2	Homogeneous Transition Metal Catalysis in the Production of Bulk Chemicals	1	I, T																																													
3	Heterogeneous Catalysis – Concepts and Examples	1	I, T																																													
4	Processes in the Oil Refinery	1	I, T																																													
5	Production of Light Alkenes + Chemicals and Polymers from Ethylene, Propylene	1	I, T																																													
6	Edible oils, Fats, Waxes, Soaps and Detergents	1	I, T																																													
7	The Solvay and Haber-Bosche processes	1	I, T																																													
8	Paints and Coatings	1	I, T																																													
9	Introductions to Polymers	1	I, T																																													
10	Introduction to Battery	1	I, T																																													
Examination forms	☐ Multiple-choice questions ☐ Report ☐ Presentation ☐ Assignments ☐ Oral examination ☒ Written examination ☐ Others, please specify:																																															
Other requirements	<u>Attendance</u>: 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. <u>Assignments/Examination</u>: Students must have more than 50/100 points overall to pass this course.																																															
Reading list	I. Textbooks [1] J.A. Moulijn, M. Makkee, A.E. van Piepen, <i>Chemical Process Technology</i>, Wiley-Interscience, 2nd Edition, 2013																																															

	[2] M.F. Ali, B.M. El Ali, J.G. Speight, <i>Hanbook of Industrial Chemistry (organic chemicals)</i>, McGraw-Hill, 2005 [3] Harold A. Wittcoff, Bryan G. Reuben, Jeffrey S. Plotkin, <i>Industrial Organic Chemicals</i>, Wiley-Interscience, 2nd Edition, 2004 II. References [1] M.A. Benvenuto, <i>Industrial Inorganic Chemistry</i>, De Gruyter, 2015 [2] A. Jess, P. Wasserscheid, <i>Chemical Technology: An Intergral Textbook</i>, Wiley-Interscience, 2013 [3] F. Cavani, G. Ceti, S. Perathoner, F. Trifiro, <i>Sustainable Industrial Processes</i>, Wiley-Interscience, 2009

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	4						
	2		6					
	3							
Skills (Level: 1-7)	4							
	5							
	6						5	
Attitudes (Level: 1-5)	7							4
	8							
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	4.0	6.0	0.0	0.0	0.0	5.0	4.0
L,M,H conversion*		H	H				H	H

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Introduction to Industrial Chemistry	1,3		- Lecture - Class discussion	[1]. [2].
2.	2	Homogeneous Transition Metal Catalysis in the Production of Bulk Chemicals	1,2,3,4	Homework	- Lecture - Class discussion	[1].
3.	3	Heterogeneous Catalysis – Concepts and Examples	1,2,3	Quiz	- Lecture - Class discussion	[1].
4.	4	Processes in the Oil Refinery	1,2,3	Homework	- Lecture - Class discussion	[1].
5.	5	Production of Light Alkenes + Chemicals and Polymers from Ethylene, Propylene	1,2	Quiz, Group work	- Lecture - Class discussion	[1].
6.	6	Edible oils, Fats, Waxes, Soaps and Detergents	1,2	Homework	- Lecture - Class discussion	
7.	7	The Solvay and Haber-Bosche processes	1,2	Group work	- Lecture - Class discussion	
8.	8	Paints and Coatings	1,2,4	Homework	- Lecture - Class discussion	
9.	9	Midterm				
10.	10	Introductions to Polymers	1,2	Group work	- Lecture - Class discussion	
11.	12	Introduction to Battery	1,2,4	Group work	- Lecture - Class discussion	
12.	17	Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
In-class exercises/quizzes/ Homework exercises (10%)	HW, Quiz 60%Pass	HW, Quiz 60%Pass		HW, Quiz 60%Pass
Group presentation (20%)	Presentation 50%Pass		Presentation 50%Pass	
Midterm exam (30%)		Q3 50%Pass	Q1, Q2 50%Pass	
Final exam (40%)	Part I 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): No

6. Revision Date: May 20, 2023

Ho Chi Minh City, 20/5/2023

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	An ability to identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	An ability to communicate (in English) effectively with a range of audiences
4	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



**VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY**
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Reaction Kinetics and Catalysis

(Động học phản ứng và xúc tác)

Course Code: CHE2011IU

1. General information

Course designation	This course provides students with the principal knowledge of homogeneous and heterogeneous catalysis. The course covers the definition of catalysis, adsorption-desorption, surface area, and porosity; Langmuir-Hinshelwood kinetics, kinetic modeling; characterization of catalysis; and reaction rate theory.																																								
Teaching schedule	☐ Year 1 ☐ Year 2 ☒ Year 3 ☐ Year 4 ☐ Year 5 ☒ Semester 1 ☐ Semester 2 ☐ Summer																																								
Person In-Charge	Dr. Phùng Thanh Khoa, ptkhoa@hcmiu.edu.vn																																								
Language	English																																								
Relation to curriculum	☐ General ☐ Fundamental ☒ Specialization ☐ Project/Internship/Thesis			☒ Compulsory ☐ Elective																																					
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify:																																								
Workload	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th></th><th></th><th>Lecture</th><th>Lab</th><th>Project</th><th>Internship</th><th>Thesis</th></tr> </thead> <tbody> <tr> <td></td><td><i>Credit</i></td><td>3</td><td></td><td></td><td></td><td></td></tr> <tr> <td>Contact hours</td><td>37.5</td><td>37.5</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td>Self-Study hours</td><td>90</td><td>90</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td>Total workload</td><td>127.5</td><td>127.5</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> </tbody> </table>								Lecture	Lab	Project	Internship	Thesis		<i>Credit</i>	3					Contact hours	37.5	37.5	0	0	0	0	Self-Study hours	90	90	0	0	0	0	Total workload	127.5	127.5	0	0	0	0
		Lecture	Lab	Project	Internship	Thesis																																			
	<i>Credit</i>	3																																							
Contact hours	37.5	37.5	0	0	0	0																																			
Self-Study hours	90	90	0	0	0	0																																			
Total workload	127.5	127.5	0	0	0	0																																			

Credit points	3						
Requirements for taking the course	☒ None ☐ Prerequisite course: <i>(Please specify course ID & course title, if any)</i> ☐ Parallel course: <i>(Please specify course ID & course title, if any)</i> ☐ Previous course: <i>(Please specify course ID & course title, if any)</i>						
Course objectives	Upon successful completion of this course, the students should demonstrate knowledge of: - Principles of homogeneous and heterogeneous catalysts. - Methods used for characterization of catalysts. - Methods for preparation catalysts - Understand reaction rate and reaction kinetics. Industrial catalysts in catalysis processes, and modern catalysts						
Course learning outcomes	Upon the successful completion of this course, students will be able to: <table border="1"> <thead> <tr> <th>Competency level¹</th><th>Course learning outcome (CLO)</th></tr> </thead> <tbody> <tr> <td>Knowledge</td><td> CLO1. Be able to explain how homogeneous and heterogeneous catalysts work [Evaluating]. CLO2. Be able to apply knowledge in catalysis in applying engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors [Creating]. </td></tr> <tr> <td>Skill</td><td>CLO3. Acquire and apply new knowledge as needed, using appropriate learning strategies [Mechanism].</td></tr> </tbody> </table>	Competency level ¹	Course learning outcome (CLO)	Knowledge	CLO1. Be able to explain how homogeneous and heterogeneous catalysts work [Evaluating]. CLO2. Be able to apply knowledge in catalysis in applying engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors [Creating].	Skill	CLO3. Acquire and apply new knowledge as needed, using appropriate learning strategies [Mechanism].
Competency level ¹	Course learning outcome (CLO)						
Knowledge	CLO1. Be able to explain how homogeneous and heterogeneous catalysts work [Evaluating]. CLO2. Be able to apply knowledge in catalysis in applying engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors [Creating].						
Skill	CLO3. Acquire and apply new knowledge as needed, using appropriate learning strategies [Mechanism].						

¹ Level of competence according to Bloom's Taxonomy:

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x
Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination
Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x

	Attitude	CLO4. Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts [Valuing].																																									
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> <u>Weight</u>: lecture session (2.5 hours) <u>Teaching levels</u>: I (Introduce); T (Teach); U (Utilize) <table><tr><th>No.</th><th>Topic</th><th>Weight</th><th>Level</th></tr><tr><td>1</td><td>Introduction of catalysis: homogeneous and heterogeneous catalysis</td><td>1</td><td>I, T</td></tr><tr><td>2</td><td>Kinetics: Rate equation, reaction mechanism, adsorption/desorption, Langmuir adsorption isotherm and Langmuir–Hinshelwood Kinetics</td><td>2</td><td>I, T</td></tr><tr><td>3</td><td>Reaction rate theory</td><td>1</td><td>I, T</td></tr><tr><td>4</td><td>Catalyst Characterization</td><td>2</td><td>I, T</td></tr><tr><td>5</td><td>Solid catalysts</td><td>1</td><td>I, T</td></tr><tr><td>6</td><td>Catalysis in Practice: Synthesis Gas and Hydrogen</td><td>1</td><td>I, T</td></tr><tr><td>7</td><td>Oil Refining and Petrochemistry</td><td>1</td><td>I, T</td></tr><tr><td>8</td><td>Environmental Catalysis</td><td>1</td><td>I, T</td></tr><tr><td>9</td><td>Modern catalysts</td><td>1</td><td>I, T</td></tr></table>			No.	Topic	Weight	Level	1	Introduction of catalysis: homogeneous and heterogeneous catalysis	1	I, T	2	Kinetics: Rate equation, reaction mechanism, adsorption/desorption, Langmuir adsorption isotherm and Langmuir–Hinshelwood Kinetics	2	I, T	3	Reaction rate theory	1	I, T	4	Catalyst Characterization	2	I, T	5	Solid catalysts	1	I, T	6	Catalysis in Practice: Synthesis Gas and Hydrogen	1	I, T	7	Oil Refining and Petrochemistry	1	I, T	8	Environmental Catalysis	1	I, T	9	Modern catalysts	1	I, T
No.	Topic	Weight	Level																																								
1	Introduction of catalysis: homogeneous and heterogeneous catalysis	1	I, T																																								
2	Kinetics: Rate equation, reaction mechanism, adsorption/desorption, Langmuir adsorption isotherm and Langmuir–Hinshelwood Kinetics	2	I, T																																								
3	Reaction rate theory	1	I, T																																								
4	Catalyst Characterization	2	I, T																																								
5	Solid catalysts	1	I, T																																								
6	Catalysis in Practice: Synthesis Gas and Hydrogen	1	I, T																																								
7	Oil Refining and Petrochemistry	1	I, T																																								
8	Environmental Catalysis	1	I, T																																								
9	Modern catalysts	1	I, T																																								
Examination forms	☐ Multiple-choice questions ☐ Report ☐ Presentation ☐ Assignments ☐ Oral examination ☒ Written examination ☐ Others, please specify:																																										
Other requirements	<u>Attendance</u>: 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. <u>Assignments/Examination</u>: Students must have more than 50/100 points overall to pass this course.																																										

Reading list	I. Textbooks [1] I. Chorkendorff, J.W. Niemantsverdriet, <i>Concepts of Modern Catalysis and Kinetics</i> , 3rd Ed., 2017. II. References

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	5						
	2		6					
	3							
Skills (Level: 1-7)	4							
	5							
	6						4	
Attitudes (Level: 1-5)	7							4
	8							
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	5.0	6.0	0.0	0.0	0.0	4.0	4.0
L,M,H conversion*		H	H				H	H

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Introduction of catalysis: homogeneous and heterogeneous catalysis	1,3		- Lecture - Class discussion	[1].
2.	2,3,4	Kinetics: Rate equation, reaction mechanism, adsorption/desorption, Langmuir adsorption isotherm and Langmuir–Hinshelwood Kinetics	1,3	Homework	- Lecture - Class discussion	[1].
3.	5	Reaction rate theory	1,3	Quiz	- Lecture - Class discussion	[1].
4.	6,7	Catalyst Characterization	2,3	Homework	- Lecture - Class discussion	[1].
5.	8	Solid catalysts	1,2,3	Homework	- Lecture - Class discussion	[1].
6.	10	Catalysis in Practice: Synthesis Gas and Hydrogen	2,4	Homework	- Lecture - Class discussion	[1].
7.	9	Midterm				
8.	11	Oil Refining and Petrochemistry	2,4	Homework	- Lecture - Class discussion	[1].
9.	12	Environmental Catalysis	2,4	Quiz	- Lecture - Class discussion	[1].
10.	13	Modern catalysts	2,4	Homework	- Lecture - Class discussion	[1].
11.	14,15	Project presentations	1,2,3,4		- oral presentation - Class discussion	
12.	16	Revision			Review-Test	
13.	17	Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
In-class exercises/quizzes (10%)	HW, Quiz 60%Pass	HW, Quiz 60%Pass		HW, Quiz 60%Pass
Project presentations (15%)	Presentation 50%Pass	Presentation 50%Pass	Presentation 50%Pass	
Midterm exam (35%)		Q3 50%Pass	Q1, Q2 50%Pass	
Final exam (40%)	Part I 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): No

6. Revision Date: May 20, 2023

Ho Chi Minh City, 20/5/2023

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	An ability to identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	An ability to communicate (in English) effectively with a range of audiences
4	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Computational Chemistry Lab

(Thực hành hóa tính toán)

Course Code: CHE2025IU

1. General information

Course designation	The course addresses computer-based calculations within chemistry. The course integrates theory with practical computation elements applied within the fields of environmental chemistry, protein chemistry and medicinal chemistry. The students are expected to acquire knowledge within quantum chemistry, molecular mechanics, and the theoretical characterisation of molecules, and applied methods for computation of the geometric and electronic structure of molecules. The course comprises both theory and practical application of important concepts within quantum chemistry and molecular mechanics. Central concepts for the computer-based application of organic molecules within quantum chemistry will be described and discussed. The focus within molecular mechanics is on describing and discussing the practical application of organic molecules, including proteins. The theory behind methods, practical execution and assessment of the quality of the sequence comparison are addressed and discussed. The theoretical characterisation of molecules interconnects the various sections of the course, i.e., quantum chemistry and molecular mechanics.	
Teaching schedule	☐ Year 1 ☐ Year 2 ☒ Year 3 ☐ Year 4 ☐ Year 5	
	☐ Semester 1 ☒ Semester 2 ☐ Summer	
Person In-Charge	Assoc. Prof. Huynh Kim Lam, hklam@hcmiu.edu.vn	
Language	English	
Relation to curriculum	☐ General ☒ Fundamental ☐ Specialization	☒ Compulsory ☐ Elective

	☐ Project/Internship/Thesis																																				
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify:																																				
Workload	<table border="1"> <tr> <td></td><td></td><td>Lecture</td><td>Lab</td><td>Project</td><td>Internship</td><td>Thesis</td></tr> <tr> <td></td><td><i>Credit</i></td><td></td><td>1</td><td></td><td></td><td></td></tr> <tr> <td>Contact hours</td><td>25</td><td>0</td><td>25</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td>Self-Study hours</td><td>30</td><td>0</td><td>30</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td>Total workload</td><td>55</td><td>0</td><td>55</td><td>0</td><td>0</td><td>0</td></tr> </table>				Lecture	Lab	Project	Internship	Thesis		<i>Credit</i>		1				Contact hours	25	0	25	0	0	0	Self-Study hours	30	0	30	0	0	0	Total workload	55	0	55	0	0	0
		Lecture	Lab	Project	Internship	Thesis																															
	<i>Credit</i>		1																																		
Contact hours	25	0	25	0	0	0																															
Self-Study hours	30	0	30	0	0	0																															
Total workload	55	0	55	0	0	0																															
Credit points	1																																				
Requirements for taking the course	☐ None ☐ Prerequisite course: <i>(Please specify course ID & course title, if any)</i> ☒ Parallel course: Computational Chemistry CHE2023IU ☐ Previous course: <i>(Please specify course ID & course title, if any)</i>																																				
Course objectives	- The students acquire knowledge within quantum chemistry, molecular mechanics, and the theoretical characterisation of molecules, and applied methods for computation of the geometric and electronic structure of molecules - Able to calculate the thermodynamic properties for a species of interest and kinetic data for a chemical reaction in gas and condensed phases using computer. - Able to obtain molecular properties from computational tools as well as available databases. - Describe and identify the various methods' advantages and disadvantages for simulating/modelling various scientific problems. - Students know how to solve the models using computer-based software. - Student can interpret the solutions. - Students can solve practical problems																																				
Course learning outcomes	Upon the successful completion of this course, students will be able to: <table border="1"> <tr> <th>Competency level</th><th>Course learning outcome (CLO)</th></tr> <tr> <td>Knowledge</td><td>CLO1. Explain the most important principles for quantum chemical and molecular mechanic methods of computing the geometry and energy of molecules</td></tr> </table>		Competency level	Course learning outcome (CLO)	Knowledge	CLO1. Explain the most important principles for quantum chemical and molecular mechanic methods of computing the geometry and energy of molecules																															
Competency level	Course learning outcome (CLO)																																				
Knowledge	CLO1. Explain the most important principles for quantum chemical and molecular mechanic methods of computing the geometry and energy of molecules																																				

		CLO2. Plan and apply computer-based calculations to determine the geometry, energies and electronic properties of molecules																																										
	Skill	CLO3. Describe theoretical methods and plan and conduct computer-based calculations of chemical properties (for example, size, hydrophobicity, dipole moment, thermodynamic properties) in molecules and relate these to biological/environmental chemical effects via calculation models CLO4. Critically examine and discuss the results from computer-based computational chemistry CLO5. Present and discuss, verbally and in writing with various different groups, academic work from a societal and scientific perspective.																																										
	Attitude																																											
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> Weight: lecture session (2.5 hours) Teaching levels: I (Introduce); T (Teach); U (Utilize) <table border="1"> <thead> <tr> <th>Topic</th><th>Weight</th><th>Level</th></tr> </thead> <tbody> <tr> <td>Ab initio Methods</td><td>1</td><td>I, T, U</td></tr> <tr> <td>Semi-empirical Methods</td><td>1</td><td>T, U</td></tr> <tr> <td>Density Functional Theory</td><td>1</td><td>T, U</td></tr> <tr> <td>Molecular Mechanics</td><td>1</td><td>T, U</td></tr> <tr> <td>Molecular Dynamics and Monte Carlo Simulation</td><td>1</td><td>T, U</td></tr> <tr> <td>Predicting Molecular Geometry</td><td>1</td><td>T, U</td></tr> <tr> <td>Constructing a Z-matrix and using existing Basis Sets</td><td>1</td><td>T, U</td></tr> <tr> <td>Molecular Vibration</td><td>1</td><td>U</td></tr> <tr> <td>Population Analysis</td><td>1</td><td>T, U</td></tr> <tr> <td>Other Chemical Properties</td><td>1</td><td>T, U</td></tr> <tr> <td>Thermodynamic properties Calculations</td><td>1</td><td>T, U</td></tr> <tr> <td>Potential Energy Surface and Kinetic Calculations</td><td>3</td><td>U</td></tr> <tr> <td></td><td>1</td><td>U</td></tr> </tbody> </table>		Topic	Weight	Level	Ab initio Methods	1	I, T, U	Semi-empirical Methods	1	T, U	Density Functional Theory	1	T, U	Molecular Mechanics	1	T, U	Molecular Dynamics and Monte Carlo Simulation	1	T, U	Predicting Molecular Geometry	1	T, U	Constructing a Z-matrix and using existing Basis Sets	1	T, U	Molecular Vibration	1	U	Population Analysis	1	T, U	Other Chemical Properties	1	T, U	Thermodynamic properties Calculations	1	T, U	Potential Energy Surface and Kinetic Calculations	3	U		1	U
Topic	Weight	Level																																										
Ab initio Methods	1	I, T, U																																										
Semi-empirical Methods	1	T, U																																										
Density Functional Theory	1	T, U																																										
Molecular Mechanics	1	T, U																																										
Molecular Dynamics and Monte Carlo Simulation	1	T, U																																										
Predicting Molecular Geometry	1	T, U																																										
Constructing a Z-matrix and using existing Basis Sets	1	T, U																																										
Molecular Vibration	1	U																																										
Population Analysis	1	T, U																																										
Other Chemical Properties	1	T, U																																										
Thermodynamic properties Calculations	1	T, U																																										
Potential Energy Surface and Kinetic Calculations	3	U																																										
	1	U																																										

Examination forms	☐ Multiple-choice questions ☐ Oral examination ☐ Report ☒ Written examination ☐ Presentation ☐ Others, please specify: ☐ Assignments
Other requirements	<u>Attendance:</u> 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. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.
Reading list	

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	2						
	2	3						
	3	3						
Skills (Level: 1-7)	4			3				
Attitudes (Level: 1-5)	5							3
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	2.7	0.0	3.0	0.0	0.0	0.0	3.0
L,M,H conversion*		L		M				M

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

Week	Content	Learning outcome	Teaching and learning activities	Assessment
1	Lab1	CLO1		
2	Lab2	CLO2		Homework + Labwork
3	Lab3	CLO3		Homework + Labwork
4	Lab4	CLO4		Homework + Labwork
5	Lab5	CLO5		Homework + Labwork
FINAL EVALUATION				Written exam

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4	CLO5
Class participation and Assignments (70%)	60% Pass	60% Pass	60% Pass	60% Pass	60% Pass
Final evaluation (30%)	60% Pass	60% Pass	60% Pass	60% Pass	60% Pass

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

5. Date revised: May 20, 20223

Ho Chi Minh City, 20/5/2023

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	An ability to identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	An ability to communicate (in English) effectively with a range of audiences
4	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

RECORD OF REVISIONS

[illegible]



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Computational Chemistry
(Hóa tính toán)

Course Code: CHE2023IU

1. General information

Course designation	The course addresses computer-based calculations within chemistry. The course integrates theory with practical computation elements applied within the fields of environmental chemistry, protein chemistry and medicinal chemistry. The students are expected to acquire knowledge within quantum chemistry, molecular mechanics, and the theoretical characterisation of molecules, and applied methods for computation of the geometric and electronic structure of molecules. The course comprises both theory and practical application of important concepts within quantum chemistry and molecular mechanics. Central concepts for the computer-based application of organic molecules within quantum chemistry will be described and discussed. The focus within molecular mechanics is on describing and discussing the practical application of organic molecules, including proteins. The theory behind methods, practical execution and assessment of the quality of the sequence comparison are addressed and discussed. The theoretical characterisation of molecules interconnects the various sections of the course, i.e., quantum chemistry and molecular mechanics.		
Teaching schedule	☐ Year 1 ☐ Year 2 ☒ Year 3 ☐ Year 4 ☐ Year 5		
	☐ Semester 1 ☒ Semester 2 ☐ Summer		
Person In-Charge	Assoc. Prof. Huynh Kim Lam, hklam@hcmiu.edu.vn		
Language	English		
Relation to curriculum	☐ General ☒ Fundamental ☒ Specialization	☒ Compulsory ☐ Elective	

	☐ Project/Internship/Thesis																																								
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify:																																								
Workload	<table border="1"> <tr> <td></td> <td></td> <td>Lecture</td> <td>Lab</td> <td>Project</td> <td>Internship</td> <td>Thesis</td> </tr> <tr> <td></td> <td><i>Credit</i></td> <td>2</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Contact hours</td> <td>25</td> <td>25</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>Self-Study hours</td> <td>60</td> <td>60</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>Total workload</td> <td>85</td> <td>85</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> </tr> </table>								Lecture	Lab	Project	Internship	Thesis		<i>Credit</i>	2					Contact hours	25	25	0	0	0	0	Self-Study hours	60	60	0	0	0	0	Total workload	85	85	0	0	0	0
		Lecture	Lab	Project	Internship	Thesis																																			
	<i>Credit</i>	2																																							
Contact hours	25	25	0	0	0	0																																			
Self-Study hours	60	60	0	0	0	0																																			
Total workload	85	85	0	0	0	0																																			
Credit points	2																																								
Requirements for taking the course	☐ None ☐ Prerequisite course: <i>(Please specify course ID & course title, if any)</i> ☒ Parallel course: Computational Chemistry Lab CHE2025IU ☐ Previous course: <i>(Please specify course ID & course title, if any)</i>																																								
Course objectives	- The students acquire knowledge within quantum chemistry, molecular mechanics, and the theoretical characterisation of molecules, and applied methods for computation of the geometric and electronic structure of molecules - Able to calculate the thermodynamic properties for a species of interest and kinetic data for a chemical reaction in gas and condensed phases using computer. - Able to obtain molecular properties from computational tools as well as available databases. - Describe and identify the various methods' advantages and disadvantages for simulating/modelling various scientific problems. - Students know how to solve the models using computer-based software. - Student can interpret the solutions. - Students can solve practical problems																																								
Course learning outcomes	Upon the successful completion of this course, students will be able to: <table border="1"> <tr> <th>Competency level</th> <th>Course learning outcome (CLO)</th> </tr> <tr> <td>Knowledge</td> <td>CLO1. Explain the most important principles for quantum chemical and molecular mechanic methods of computing the geometry and energy of molecules</td> </tr> </table>						Competency level	Course learning outcome (CLO)	Knowledge	CLO1. Explain the most important principles for quantum chemical and molecular mechanic methods of computing the geometry and energy of molecules																															
Competency level	Course learning outcome (CLO)																																								
Knowledge	CLO1. Explain the most important principles for quantum chemical and molecular mechanic methods of computing the geometry and energy of molecules																																								

		CLO2. Plan and apply computer-based calculations to determine the geometry, energies and electronic properties of molecules																																										
	Skill	CLO3. Describe theoretical methods and plan and conduct computer-based calculations of chemical properties (for example, size, hydrophobicity, dipole moment, thermodynamic properties) in molecules and relate these to biological/environmental chemical effects via calculation models CLO4. Critically examine and discuss the results from computer-based computational chemistry CLO5. Present and discuss, verbally and in writing with various different groups, academic work from a societal and scientific perspective.																																										
	Attitude																																											
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> Weight: lecture session (2.5 hours) Teaching levels: I (Introduce); T (Teach); U (Utilize) <table border="1"> <thead> <tr> <th>Topic</th><th>Weight</th><th>Level</th></tr> </thead> <tbody> <tr> <td>Ab initio Methods</td><td>1</td><td>I, T, U</td></tr> <tr> <td>Semi-empirical Methods</td><td>1</td><td>T, U</td></tr> <tr> <td>Density Functional Theory</td><td>1</td><td>T, U</td></tr> <tr> <td>Molecular Mechanics</td><td>1</td><td>T, U</td></tr> <tr> <td>Molecular Dynamics and Monte Carlo Simulation</td><td>1</td><td>T, U</td></tr> <tr> <td>Predicting Molecular Geometry</td><td>1</td><td>T, U</td></tr> <tr> <td>Constructing a Z-matrix and using existing Basis Sets</td><td>1</td><td>T, U</td></tr> <tr> <td>Molecular Vibration</td><td>1</td><td>U</td></tr> <tr> <td>Population Analysis</td><td>1</td><td>T, U</td></tr> <tr> <td>Other Chemical Properties</td><td>1</td><td>T, U</td></tr> <tr> <td>Thermodynamic properties Calculations</td><td>1</td><td>T, U</td></tr> <tr> <td>Potential Energy Surface and Kinetic Calculations</td><td>3</td><td>U</td></tr> <tr> <td></td><td>1</td><td>U</td></tr> </tbody> </table>		Topic	Weight	Level	Ab initio Methods	1	I, T, U	Semi-empirical Methods	1	T, U	Density Functional Theory	1	T, U	Molecular Mechanics	1	T, U	Molecular Dynamics and Monte Carlo Simulation	1	T, U	Predicting Molecular Geometry	1	T, U	Constructing a Z-matrix and using existing Basis Sets	1	T, U	Molecular Vibration	1	U	Population Analysis	1	T, U	Other Chemical Properties	1	T, U	Thermodynamic properties Calculations	1	T, U	Potential Energy Surface and Kinetic Calculations	3	U		1	U
Topic	Weight	Level																																										
Ab initio Methods	1	I, T, U																																										
Semi-empirical Methods	1	T, U																																										
Density Functional Theory	1	T, U																																										
Molecular Mechanics	1	T, U																																										
Molecular Dynamics and Monte Carlo Simulation	1	T, U																																										
Predicting Molecular Geometry	1	T, U																																										
Constructing a Z-matrix and using existing Basis Sets	1	T, U																																										
Molecular Vibration	1	U																																										
Population Analysis	1	T, U																																										
Other Chemical Properties	1	T, U																																										
Thermodynamic properties Calculations	1	T, U																																										
Potential Energy Surface and Kinetic Calculations	3	U																																										
	1	U																																										

Examination forms	☐ Multiple-choice questions ☐ Oral examination ☐ Report ☒ Written examination ☐ Presentation ☐ Others, please specify: ☐ Assignments
Other requirements	<u>Attendance:</u> 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. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.
Reading list	

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	2						
	2	3						
	3	3						
Skills (Level: 1-7)	4			3				
Attitudes (Level: 1-5)	5							3
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	2.7	0.0	3.0	0.0	0.0	0.0	3.0
L,M,H conversion*		L		M				M

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

Week	Content	Learning outcome	Teaching and learning activities	Assessment
1	Introduction and Fundamental principles: energy, electrostatics, atomic units, thermodynamics, quantum mechanics, statistical mechanics	G1	- Lecture - Class discussion	
2	Ab initio Methods	G1	- Lecture - Class discussion	Homework + Labwork
3	Semi-empirical Methods	G1	- Lecture - Class discussion	Homework + Labwork
4	Density Functional Theory	G1	- Lecture - Class discussion	Homework + Labwork
5	Molecular Mechanics	G1	- Lecture - Class discussion	Homework + Labwork
6	Molecular Dynamics and Monte Carlo Simulation	G1	- Lecture - Class discussion	Homework + Labwork
7	Predicting Molecular Geometry	G1, G2	- Lecture - Class discussion	Homework + Labwork
MIDTERM EXAM				Written exam
8	Constructing a Z-matrix and using existing Basis Sets Molecular Vibration	G1, G2	- Lecture - Class discussion	Homework + Labwork
9	Population Analysis Other Chemical Properties	G1, G2	- Lecture - Class discussion	Homework + Labwork
10	Thermodynamic properties Calculations	G1, G2	- Lecture - Class discussion	Homework + Labwork

	Potential Energy Surface and Kinetic Calculations			
FINAL EXAMINATION				Written exam

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4	CLO5	CLO6	CLO7	CLO8	CLO9
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. Date revised: May 20, 20223

Ho Chi Minh City, 20/5/2023

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	An ability to identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	An ability to communicate (in English) effectively with a range of audiences
4	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

RECORD OF REVISIONS

No.	Session/Page	Content of revision	Date of revision	Revised by



**VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY**
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Simulation and Optimization

(Mô phỏng và Tối ưu hóa)

Course Code: CHE2034IU

1. General information

Course designation	This course aims at introducing students to use quantitative methods and techniques for effective decisions-making; model formulation and applications that are used in solving business decision problems.																																								
Teaching schedule	☐ Year 1 ☐ Year 2 ☒ Year 3 ☐ Year 4 ☐ Year 5 ☒ Semester 1 ☒ Semester 2 ☐ Summer																																								
Person In-Charge	Dr. Vu Bao Khanh, vbkhanh@hcmiu.edu.vn																																								
Language	English																																								
Relation to curriculum	☐ General ☒ Fundamental ☐ Specialization ☐ Project/Internship/Thesis			☒ Compulsory ☐ Elective																																					
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify:																																								
Workload	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th></th><th></th><th>Lecture</th><th>Lab</th><th>Project</th><th>Internship</th><th>Thesis</th></tr> </thead> <tbody> <tr> <td></td><td><i>Credit</i></td><td>2</td><td>0</td><td></td><td></td><td></td></tr> <tr> <td>Contact hours</td><td>25</td><td>25</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td>Self-Study hours</td><td>60</td><td>60</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td>Total workload</td><td>85</td><td>85</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> </tbody> </table>								Lecture	Lab	Project	Internship	Thesis		<i>Credit</i>	2	0				Contact hours	25	25	0	0	0	0	Self-Study hours	60	60	0	0	0	0	Total workload	85	85	0	0	0	0
		Lecture	Lab	Project	Internship	Thesis																																			
	<i>Credit</i>	2	0																																						
Contact hours	25	25	0	0	0	0																																			
Self-Study hours	60	60	0	0	0	0																																			
Total workload	85	85	0	0	0	0																																			
Credit points	2																																								

Requirements for taking the course	☒ None ☐ Prerequisite course: ☒ Parallel course: Optimization and Simulation Lab (CHE2035IU) ☐ Previous course:																																
Course objectives	This course is to introduce the fundamental methods used in deterministic operations research and to use of numerical analysis and linear algebra to solve industrial engineering problems. Topics to be covered include: problem formulations, simplex method in table form, big-M method, duality theory, an introduction to the geometry of the simplex method, sensitivity analysis, and integer program.																																
Course learning outcomes	Upon the successful completion of this course, students will be able to: <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 15%;">Competency level¹</th><th>Course learning outcome (CLO)</th></tr> </thead> <tbody> <tr> <td>Knowledge</td><td> CLO1. Describe the fundamental principles and concepts of operations research, including optimization, decision analysis, and modeling. [Remember] CLO2. Apply mathematical and statistical tools to solve a variety of operational and decision-making problems, including linear and nonlinear programming. [Apply] </td></tr> <tr> <td>Skill</td><td>CLO3. Use software tools to model and analyze complex systems, including spreadsheets, optimization software, and simulation packages. [Mechanism]</td></tr> <tr> <td>Attitude</td><td>CLO4. Demonstrate an appreciation for the role of mathematical modeling and optimization in improving efficiency, effectiveness, and decision-making in organizations. [Valuing]</td></tr> </tbody> </table>	Competency level ¹	Course learning outcome (CLO)	Knowledge	CLO1. Describe the fundamental principles and concepts of operations research, including optimization, decision analysis, and modeling. [Remember] CLO2. Apply mathematical and statistical tools to solve a variety of operational and decision-making problems, including linear and nonlinear programming. [Apply]	Skill	CLO3. Use software tools to model and analyze complex systems, including spreadsheets, optimization software, and simulation packages. [Mechanism]	Attitude	CLO4. Demonstrate an appreciation for the role of mathematical modeling and optimization in improving efficiency, effectiveness, and decision-making in organizations. [Valuing]																								
Competency level ¹	Course learning outcome (CLO)																																
Knowledge	CLO1. Describe the fundamental principles and concepts of operations research, including optimization, decision analysis, and modeling. [Remember] CLO2. Apply mathematical and statistical tools to solve a variety of operational and decision-making problems, including linear and nonlinear programming. [Apply]																																
Skill	CLO3. Use software tools to model and analyze complex systems, including spreadsheets, optimization software, and simulation packages. [Mechanism]																																
Attitude	CLO4. Demonstrate an appreciation for the role of mathematical modeling and optimization in improving efficiency, effectiveness, and decision-making in organizations. [Valuing]																																
¹ Level of competence according to Bloom's Taxonomy: <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th></th><th>Level 1</th><th>Level 2</th><th>Level 3</th><th>Level 4</th><th>Level 5</th><th>Level 6</th><th>Level 7</th></tr> </thead> <tbody> <tr> <td>Knowledge</td><td>Remembering</td><td>Understanding</td><td>Applying</td><td>Analyzing</td><td>Evaluating</td><td>Creating</td><td style="background-color: #cccccc;">x</td></tr> <tr> <td>Skills</td><td>Perception</td><td>Set</td><td>Guided Response</td><td>Mechanism</td><td>Complex Overt Response</td><td>Adaptation</td><td>Origination</td></tr> <tr> <td>Attitudes</td><td>Receiving Phenomena</td><td>Responding to Phenomena</td><td>Valuing</td><td>Organization</td><td>Internalizing values</td><td style="background-color: #cccccc;">x</td><td style="background-color: #cccccc;">x</td></tr> </tbody> </table>			Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7	Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x	Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination	Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x
	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7																										
Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x																										
Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination																										
Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x																										
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> <u>Weight</u>: lecture session (2.5 hours)																																

	<u>Teaching levels:</u> I (Introduce); T (Teach); U (Utilize)			
	No.	Topic	Weight	Level
	1	Introduction to operations research	1	U
	2	Formulate linear programming problems	2	U
	3	solution of an LP: graphical solution	1	U
	4	Solution of an LP: simplex method, standard form, degeneracy, alternate solutions, unbounded LP, infeasible LP	2	U
	5	Solution of an LP: finding an initial feasible solution, big-M method, two-phase method	2	U
	6	Revised simplex method, simplex formulas, shadow price, reduce cost	2	U
	7	Sensitivity analysis: changing the objective function coefficient of a basic variable, changing the objective function coefficient of a nonbasic variable, changing the constraint coefficient of a nonbasic variable, changing the RHS values of constraints, adding a new variable.		
	8	Degeneracy and cycling in linear programming		
	9	Integer programming problems. Solving integer programs using branch and bound method		
	10	Application of simulation and optimization in chemical engineering.		
Examination forms	☐ Multiple-choice questions ☐ Oral examination ☐ Report ☒ Written examination ☐ Presentation ☐ Others, please specify: ☐ Assignments			
Other requirements	<u>Attendance:</u> 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. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.			
Reading list	I. Textbooks [1] Hillier and Lieberman, Introduction to Operations Research, McGraw Hill, 1995, 7th Ed. [2] Wayne L. Winston and Munirpallam Venkataramanan, Introduction to Mathematical Programming. Operations Research: Volume one, DuxBury, 2003, 4th edition. [3] Hamdy A. Taha, Operation Research: An Introduction, Prentice Hall, 2003, 7th Edition.			

	II. References

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	1						
	2	3						
Skills (Level: 1-7)	3					4	4	
Attitudes (Level: 1-5)	4							3
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	2.0	0.0	0.0	0.0	4.0	4.0	3.0
L,M,H conversion*		L				H	H	M

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Introduction to operations research	1		Lecture	
2.	2	Formulate linear programming problems	1	HW	Lecture	
3.	3	solution of an LP: graphical solution	1,2	HW	Lecture	
4.	4	Solution of an LP: simplex method, standard form, degeneracy, alternate solutions, unbounded LP, infeasible LP	1,2	HW	Lecture	
5.	5	Solution of an LP: finding an initial feasible solution, big-M method, two-phase method	1,2	HW	Lecture	
6.	6	Revised simplex method, simplex formulas, shadow price, reduce cost	1,2	HW	Lecture	
7.	7	Sensitivity analysis: changing the objective function coefficient of a basic variable, changing the objective function coefficient of a	2,3,5	HW	Lecture	

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
		nonbasic variable, changing the constraint coefficient of a nonbasic variable, changing the RHS values of constraints, adding a new variable.				
8.	8	Degeneracy and cycling in linear programming	2	HW	Lecture	
9.	9-10	Midterm exam				
10.	11	Integer programming problems. Solving integer programs using branch and bound method	1,2,4	HW	Lecture	
11.	12	Application of simulation and optimization in chemical engineering.	4	HW	Lecture	
12.	18	Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4	CLO5
Homework (30%)	>50% pass	>50% pass			
Midterm exam (30%)		>50% pass			
Final exam (40%)			>50% pass		

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

5. Rubrics (optional): No

6. Revision Date: May 20, 2023

Ho Chi Minh City, 20/5/2023

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Simulation and Optimization Laboratory

(Thực hành mô phỏng và tối ưu hóa)

Course Code: CHE2035IU

1. General information

Course designation	The lab aims to provide students with hands-on experience in applying various OR techniques and methods to solve real-world problems. Students will learn how to model and formulate optimization problems, analyze data, and implement OR algorithms.																																								
Teaching schedule	☐ Year 1 ☐ Year 2 ☒ Year 3 ☐ Year 4 ☐ Year 5 ☒ Semester 1 ☒ Semester 2 ☐ Summer																																								
Person In-Charge	Dr. Vu Bao Khanh, vbkhanh@hcmiu.edu.vn																																								
Language	English																																								
Relation to curriculum	☐ General ☒ Fundamental ☐ Specialization ☐ Project/Internship/Thesis			☒ Compulsory ☐ Elective																																					
Teaching methods	☐ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify: laboratory																																								
Workload	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th><th></th><th>Lecture</th><th>Lab</th><th>Project</th><th>Internship</th><th>Thesis</th></tr> </thead> <tbody> <tr> <td></td><td><i>Credit</i></td><td>0</td><td>1</td><td></td><td></td><td></td></tr> <tr> <td>Contact hours</td><td>25</td><td>0</td><td>25</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td>Self-Study hours</td><td>30</td><td>0</td><td>30</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td>Total workload</td><td>55</td><td>0</td><td>55</td><td>0</td><td>0</td><td>0</td></tr> </tbody> </table>								Lecture	Lab	Project	Internship	Thesis		<i>Credit</i>	0	1				Contact hours	25	0	25	0	0	0	Self-Study hours	30	0	30	0	0	0	Total workload	55	0	55	0	0	0
		Lecture	Lab	Project	Internship	Thesis																																			
	<i>Credit</i>	0	1																																						
Contact hours	25	0	25	0	0	0																																			
Self-Study hours	30	0	30	0	0	0																																			
Total workload	55	0	55	0	0	0																																			

Credit points	1						
Requirements for taking the course	☐ None ☐ Prerequisite course: ☒ Parallel course: Simulation and Optimization (CHE2034IU) ☐ Previous course:						
Course objectives	The lab focuses on developing students' problem-solving skills within the context of operations research. This includes understanding problem structures, identifying appropriate mathematical techniques, and applying optimization algorithms to find optimal solutions. Students will gain proficiency in translating real-world problems into mathematical models. They will learn how to represent decision variables, objective functions, and constraints in mathematical notation, and formulate optimization models for different types of OR problems. The lab involves implementing OR algorithms using computational tools and software packages. Students will learn how to use OR software, coding languages, or optimization libraries to solve complex optimization problems efficiently.						
Course learning outcomes	Upon the successful completion of this course, students will be able to:						
	Competency level ¹	Course learning outcome (CLO)					
	Knowledge	CLO1. Acquire knowledge of various software tools commonly used in operations research. [Understand] CLO2. Familiarize with the process of formulating optimization problems and translating them into mathematical models. [Understand]					
	Skill	CLO3. Use optimization software and programming languages to implement and solve operations research models. [Mechanism] CLO4. Use sensitivity analysis techniques to assess the robustness and sensitivity of optimization solutions. [Guided response]					
	Attitude	CLO5. Develop a problem-solving mindset, actively seeking opportunities to apply operations research techniques to improve decision-making and efficiency. [Valuing]					
¹ Level of competence according to Bloom's Taxonomy:							
	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x
Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination

Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i>						
	<u>Weight</u> : lecture session (2.5 hours)						
	<u>Teaching levels</u> : I (Introduce); T (Teach); U (Utilize)						
	No.	Topic	Weight	Level			
	1	Lab. 1: Introduction to Excel Solver for Solving Linear Programs	1	U			
	2	Lab. 2: Sensitivity Analysis by MS Excel	2	U			
	3	Exp. 3: LINDO vs EXCEL for Solving Linear Programming. Consult the LINDO/EXCEL output for Analysis	1	U			
Examination forms	☐ Multiple-choice questions ☒ Report ☐ Presentation ☐ Assignments ☐ Oral examination ☒ Written examination ☐ Others, please specify:						
Other requirements	<u>Attendance</u>: 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. <u>Assignments/Examination</u>: Students must have more than 50/100 points overall to pass this course.						
Reading list	I. Textbooks [1] Hillier and Lieberman, Introduction to Operations Research, McGraw Hill, 1995, 7th Ed. [2] Wayne L. Winston and Munirpallam Venkataramanan, Introduction to Mathematical Programming. Operations Research: Volume one, DuxBury, 2003, 4th edition. [3] Hamdy A. Taha, Operation Research: An Introduction, Prentice Hall, 2003, 7th Edition. II. References						

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-5) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	2						
	2	2						
Skills (Level: 1-7)	3						4	
Attitudes (Level: 1-5)	4							3
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	2.0	0.0	0.0	0.0	0.0	4.0	3.0
L,M,H conversion*		L					H	M

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Introduction to operations research			Lecture	
2.	2	Formulate linear programming problems	1	HW	Lecture	
3.	3	solution of an LP: graphical solution	2	HW	Lecture	
4.	4	Solution of an LP: simplex method, standard form, degeneracy, alternate solutions, unbounded LP, infeasible LP	2	HW	Lecture	
5.	5	Solution of an LP: finding an initial feasible solution, big-M method, two-phase method	2	HW	Lecture	
6.	6	Revised simplex method, simplex formulas, shadow price, reduce cost	2,4	HW	Lecture	
7.	7	Sensitivity analysis: changing the objective function coefficient of a basic variable, changing the objective function coefficient of a nonbasic variable, changing the constraint coefficient of a nonbasic variable, changing	4	HW	Lecture	

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
		the RHS values of constraints, adding a new variable.				
8.	8	Degeneracy and cycling in linear programming	2	HW	Lecture	
9.	9-10	Midterm exam				
10.	11	Integer programming problems. Solving integer programs using branch and bound method	3	HW	Lecture	
11.	12	Application of simulation and optimization in chemical engineering.		HW	Lecture	
12.	18	Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
In-class attendance (10%)				
Homework exercises (20%)	>50% pass		>50% pass	
Midterm exam (30%)	>50% pass	>50% pass		
Final exam (40%)			>50% pass	>50% pass

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

5. Rubrics (optional): No

6. Revision Date: May 20, 2023

Ho Chi Minh City, 20/5/2023

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: MASS TRANSFER OPERATIONS

(Quá trình và thiết bị truyền khối)

Course Code: CHE2041IU

1. General information

Course designation	Mass transfer processes are vital in chemical engineering because it is the method to separate or purify components from their mixtures. Through this course, students learn the principles of mass transfer and their application. The course integrates fluid dynamics and thermodynamics in order to develop rate expressions for mass transfer in multiphase and multicomponent systems. Based on Fick's law and phase equilibrium rules, the course provides knowledge of designing large scale separation processes such as distillation, extraction, drying, stripping and absorption to selectively obtain or remove specific components from mixtures. <i>Quá trình truyền khối lượng rất quan trọng trong kỹ thuật hóa học vì nó là phương pháp để tách hoặc làm sạch các thành phần trong hỗn hợp. Qua khóa học này, sinh viên sẽ học về nguyên lý truyền khối lượng và ứng dụng của nó. Khóa học tích hợp động lực học chất lưu và nhiệt động học để phát triển biểu thức tốc độ cho quá trình truyền khối lượng trong hệ thống đa pha và đa thành phần. Dựa trên định luật Fick và quy tắc cân bằng pha, khóa học cung cấp kiến thức về thiết kế các quy trình tách lớn như chưng cất, chiết xuất, làm khô, tách và hấp thụ để lựa chọn hoặc loại bỏ các thành phần cụ thể từ hỗn hợp.</i>	
Teaching schedule	☐ Year 1 ☐ Year 2 ☒ Year 3 ☐ Year 4 ☐ Year 5 ☐ Semester 1 ☒ Semester 2 ☐ Summer	
Person In-Charge	Dr. Doan Hoai Linh, dhlinh@hcmiu.edu.vn Template: (Name in Vietnamese order), (Email)	
Language	English	
Relation to curriculum	☐ General ☐ Fundamental	☒ Compulsory ☐ Elective

	☐ Specialization ☐ Project/Internship/Thesis																																				
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify:																																				
Workload	<table border="1"> <tr> <td></td><td></td><td>Lecture</td><td>Lab</td><td>Project</td><td>Internship</td><td>Thesis</td></tr> <tr> <td></td><td><i>Credit</i></td><td>3</td><td></td><td></td><td></td><td></td></tr> <tr> <td>Contact hours</td><td>37.5</td><td>37.5</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td>Self-Study hours</td><td>90</td><td>90</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td>Total workload</td><td>127.5</td><td>127.5</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> </table>				Lecture	Lab	Project	Internship	Thesis		<i>Credit</i>	3					Contact hours	37.5	37.5	0	0	0	0	Self-Study hours	90	90	0	0	0	0	Total workload	127.5	127.5	0	0	0	0
		Lecture	Lab	Project	Internship	Thesis																															
	<i>Credit</i>	3																																			
Contact hours	37.5	37.5	0	0	0	0																															
Self-Study hours	90	90	0	0	0	0																															
Total workload	127.5	127.5	0	0	0	0																															
Credit points	3																																				
Requirements for taking the course	☐ None ☐ Prerequisite course: <i>(Please specify course ID & course title, if any)</i> ☐ Parallel course: <i>(Please specify course ID & course title, if any)</i> ☒ Previous course: <i>(Please specify course ID & course title, if any) CHE2051IU Heat Transfer Operations, CHE1031IU Physical Chemistry 1</i>																																				
Course objectives	- Understanding the underlying thermodynamics and mass transfer process principles consisted of molecular diffusion, diffusion coefficient, mass transfer coefficient, and phase equilibrium. - Understanding the principles of mass transfer equipment which applies for distillation, adsorption, extraction, drying and other mass transfer processes... - Analyzing and evaluating the structure and the operation of mass transfer equipment. - Solve practical mass transfer problems																																				
Course learning outcomes	Upon the successful completion of this course, students will be able to: <table border="1"> <tr> <th>Competency level</th><th>Course learning outcome (CLO)</th></tr> <tr> <td>Knowledge</td><td>CLO1. When given a complex mass transfer problem, able to identify, formulate and solve problems by applying Fick's law, molecular diffusion, adsorption, absorption, and other mass transfer principles.</td></tr> <tr> <td>Skill</td><td>CLO2. Able to solve adsorption and absorption problems via case studies.</td></tr> </table>		Competency level	Course learning outcome (CLO)	Knowledge	CLO1. When given a complex mass transfer problem, able to identify, formulate and solve problems by applying Fick's law, molecular diffusion, adsorption, absorption, and other mass transfer principles.	Skill	CLO2. Able to solve adsorption and absorption problems via case studies.																													
Competency level	Course learning outcome (CLO)																																				
Knowledge	CLO1. When given a complex mass transfer problem, able to identify, formulate and solve problems by applying Fick's law, molecular diffusion, adsorption, absorption, and other mass transfer principles.																																				
Skill	CLO2. Able to solve adsorption and absorption problems via case studies.																																				

		CLO3. Able to design individually and in groups distillation, extraction, stripping tower, drier a by analyzing given data and formulating the practical mass transfer problems via case studies.																								
	Attitude	CLO4. Understanding of professional and ethical responsibility, a recognition of the need for, and an ability to engage in life-long learning																								
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> <u>Weight</u>: lecture session (2.5 hours) <u>Teaching levels</u>: I (Introduce); T (Teach); U (Utilize) <table><tr><th>No.</th><th>Topic</th><th>Weight</th><th>Level</th></tr><tr><td>1</td><td>Introduction</td><td>1</td><td>I,T,U</td></tr><tr><td>2</td><td>Diffusion (Fick’s 1st and 2nd law)</td><td>5</td><td>T,U</td></tr><tr><td>3</td><td>Adsorption and its applications</td><td>1</td><td>T,U</td></tr><tr><td>4</td><td>Absorption and its applications</td><td>4</td><td>T,U</td></tr><tr><td>5</td><td>Distillation, extraction process, phase diagram</td><td>4</td><td>T,U</td></tr></table>		No.	Topic	Weight	Level	1	Introduction	1	I,T,U	2	Diffusion (Fick’s 1 st and 2 nd law)	5	T,U	3	Adsorption and its applications	1	T,U	4	Absorption and its applications	4	T,U	5	Distillation, extraction process, phase diagram	4	T,U
No.	Topic	Weight	Level																							
1	Introduction	1	I,T,U																							
2	Diffusion (Fick’s 1 st and 2 nd law)	5	T,U																							
3	Adsorption and its applications	1	T,U																							
4	Absorption and its applications	4	T,U																							
5	Distillation, extraction process, phase diagram	4	T,U																							
Examination forms	☐ Multiple-choice questions☐ Oral examination ☐ Report☒ Written examination ☒ Presentation☐ Others, please specify: ☐ Assignments																									
Other requirements	<u>Attendance</u>: 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. <u>Assignments/Examination</u>: Students must have more than 50/100 points overall to pass this course.																									
Reading list	I. Textbooks [1] Robert, E. Treybal, “Mass Tranper Operations, Mac. Graw Hill, Book Company, 1968 [2] J. R. Welty, C. E. Wicks, R. E. Wilson, Fundamentales of Momentum, Heat and Mass Transfer, Joln Wiley, 1973. [3] Fundamentals of Heat & Mass Transfer by Incropera, DeWitt, Bergman, and Lavine – 6th Edition																									

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	5	3				3	
Skills (Level: 1-7)	2		4	3	3	4		
	3		4	3	3	4	3	
Attitudes (Level: 1-5)	4							3
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	5.0	3.7	3.0	3.0	4.0	3.0	3.0
L,M,H conversion*		H	M	M	M	M	M	M

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Introduction to Operations Research: definition, classification. Basic concepts of phase equilibrium, phase contents, types of concentration and conversion equations.	1	Quiz 1	Lecture, Discussion, Inclass-Quiz	[1],[2],[3]
2.	2-6	Molecular diffusion and Fick's law (1st and 2nd law). Equation of continuity Steady-state molecular diffusion in laminar flow Molecular diffusion in gases Steady state diffusion of A through non-diffusing B Steady-steady equimolar counter diffusion Steady-state diffusion in multicomponent mixtures Diffusivity of gases Molecular diffusion in liquids Stokes-Einstein Equation Dilute solutions of nonelectrolytes Solutes in aqueous solutions Steady-state binary molecular diffusion in porous liquids Steady-state molecular diffusion through variable area Mass transfer coefficient	1	Quiz 2-6	Lecture, Inclass-Quiz	[1],[2],[3]

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
		Steady and quasi-steady mass transfer Mass-transfer controlled by external diffusion resistance Diffusion controlled by external convection Repiration of a spherical cell Relationship between reaction kinetics and mass transfer Diffusion through a film within which there is a homogeneous reaction Convective mass transfer Mass transfer in falling film Laminar falling film in an inclined surface				
3.	7-8	Fundamentals of adsorption process Adosrption isotherm model: Langmuir, Freundlich, BET, Dubinin-Radushkevich, Tempkin and Pyzhev, Harkins-Jura, Halsey, Henderson. Adsorption rate Intraparticle diffusion Boyd's adsorption mass transfer rate controlling step Percent cummulative drug release The relationship between adsorption capacity, entrapment efficiency and thermodynamics properties (Gibbs free energy, entropy, enthalpy)	2	Quiz 7-8	Lecture, Inclass-Quiz	[1],[2],[3]
4.	9	Midterm				
5.	11-13	Gas-liquid absorption and stripping processes. Calculation of the minimum amount of solvent to absorb a component from a gas stream into a liquid. Designing an absorption tower. Kremser equations Packed tower, tray absorber (counter-current multi-stage absorption), absorption with chemical reaction (irreversible first-order reaction, irreversible mth order reaction) The relationship between mass transfer and thermodynamics, and solubilities Determining mass transfer properties from solubilities experimentally	3,4	Presentati on, Group problems 1	Lecture, Group work, Presentation, assignment, design problems	[1],[2],[3]
6.	14-16	Binary mixture: classification and phase equilibrium graphs (Txy, Pxy, xy) Distillation process: definition, basic principles in operation of a distillation tower.	3,4	Presentati on, Group problems 2	Lecture, Group work, Presentation,	[1],[2],[3]

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
		McCabe Thiele method to build operation lines and number of theoretical mass transfer stages of a distillation process for a binary mixture. Distillation tower design. Phase diagram (triangle diagram) for a three-component mixture: how to construct and how to use. Extraction processes: basic principles in operation and calculation. Phase diagram (triangle diagram) for a three-component mixture: how to construct and how to use. Extraction processes: basic principles in operation and calculation.			assignment , design problems	
7.	17	Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
Quiz (10%)	Quiz 1-8 50% pass	Quiz 1-8 50% pass		
Presentation (10%)			Presentation 50% pass	Presentation 50% pass
Design Problems (10%)			Group problems 50% pass	Group problems 50% pass
Midterm Exam (30%)	Q1-10 50% pass	Q1-10 50% pass		
Final Exam (40%)	Q1-8 50% pass	Q1-8 50% pass	Q1-8 50% pass	Q1-8 50% pass

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

5. Rubrics (optional): No

6. Revision Date: May 20, 2023

Ho Chi Minh City, 20/5/2023

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: HEAT TRANSFER OPERATIONS

(Quá trình và thiết bị truyền nhiệt)

Course Code: CHE2051IU

1. General information

Course designation	The course will introduce the fundamental concepts of various modes of heat transfer: conduction, convection, and radiation. It will further elaborate these concepts with theories and applications to the solutions of practically relevant chemical engineering problems. Some aspects of process design principles of various heat transfer equipment will be taken up in the later part of this course. Finally, to present a physical picture of the convection process, heat transfer in boundary layer flows will be addressed. Even though the course is primarily designed to meet the requirements of an undergraduate chemical engineering course on heat transfer, it will be useful for the practicing engineers to refresh with fundamental and technical information. <i>Môn học này sẽ giới thiệu các khái niệm cơ bản về các chế độ truyền nhiệt khác nhau: truyền nhiệt qua dẫn, truyền nhiệt qua lưu và truyền nhiệt qua bức xạ. Nó sẽ phát triển những khái niệm này với các lý thuyết và ứng dụng để giải quyết các vấn đề kỹ thuật hóa học thực tế. Một số khía cạnh về nguyên tắc thiết kế quá trình của các thiết bị truyền nhiệt khác nhau sẽ được đề cập trong phần sau của khóa học này. Cuối cùng, để trình bày một hình ảnh vật lý về quá trình lưu chất, truyền nhiệt trong luồng biên giới sẽ được thảo luận. Mặc dù khóa học được thiết kế chủ yếu để đáp ứng yêu cầu của một khóa học kỹ thuật hóa học truyền nhiệt dành cho sinh viên đại học, nó cũng hữu ích cho các kỹ sư đang làm việc để làm mới kiến thức cơ bản và kỹ thuật.</i>			
Teaching schedule	☐ Year 1 ☐ Year 2 ☒ Year 3 ☐ Year 4 ☐ Year 5			
	☒ Semester 1 ☐ Semester 2 ☐ Summer			
Person In-Charge	Dr. Doan Hoai Linh, dhlhinh@hcmiu.edu.vn Template: (Name in Vietnamese order), (Email)			
Language	English			
Relation to curriculum	☐ General		☒ Compulsory	

	☐ Fundamental ☐ Specialization ☐ Project/Internship/Thesis	☐ Elective																																							
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify:																																								
Workload	<table border="1"> <tr> <td></td><td></td><td>Lecture</td><td>Lab</td><td>Project</td><td>Internship</td><td>Thesis</td></tr> <tr> <td></td><td><i>Credit</i></td><td>3</td><td></td><td></td><td></td><td></td></tr> <tr> <td>Contact hours</td><td>37.5</td><td>37.5</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td>Self-Study hours</td><td>90</td><td>90</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td>Total workload</td><td>127.5</td><td>127.5</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> </table>								Lecture	Lab	Project	Internship	Thesis		<i>Credit</i>	3					Contact hours	37.5	37.5	0	0	0	0	Self-Study hours	90	90	0	0	0	0	Total workload	127.5	127.5	0	0	0	0
		Lecture	Lab	Project	Internship	Thesis																																			
	<i>Credit</i>	3																																							
Contact hours	37.5	37.5	0	0	0	0																																			
Self-Study hours	90	90	0	0	0	0																																			
Total workload	127.5	127.5	0	0	0	0																																			
Credit points	3																																								
Requirements for taking the course	☐ None ☐ Prerequisite course: <i>(Please specify course ID & course title, if any)</i> ☐ Parallel course: <i>(Please specify course ID & course title, if any)</i> ☒ Previous course: <i>(Please specify course ID & course title, if any) CHE1031IU Physical Chemistry 1</i>																																								
Course objectives	• Know three modes of heat transfer: conduction, convection, and radiation • Know how to calculate the heat transfer coefficients. • Understand the steady and unsteady heat conduction. • Understand boiling, condensation, and evaporation. • Know types of heat exchangers and evaporators and their design. • Understand the economical aspects in heat transfer. • Solve practical heat transfer problems.																																								
Course learning outcomes	Upon the successful completion of this course, students will be able to: <table border="1"> <tr> <th>Competency level</th><th>Course learning outcome (CLO)</th></tr> <tr> <td>Knowledge</td><td>CLO1. When given a complex heat transfer problem, able to identify, formulate, analyze, and solve problems by applying three modes of heat transfer: conduction, convection, and radiation.</td></tr> </table>						Competency level	Course learning outcome (CLO)	Knowledge	CLO1. When given a complex heat transfer problem, able to identify, formulate, analyze, and solve problems by applying three modes of heat transfer: conduction, convection, and radiation.																															
Competency level	Course learning outcome (CLO)																																								
Knowledge	CLO1. When given a complex heat transfer problem, able to identify, formulate, analyze, and solve problems by applying three modes of heat transfer: conduction, convection, and radiation.																																								

	<table><tr><td>Skill</td><td>CLO2. Able to convert between the SI and metric units systems; and apply the accounting equation to mass and energy to formulate and solve steady and unsteady heat transfer problems. CLO3. Able to design individually and in groups heat exchangers, evaporators, boiling and condensation systems by analyzing given data and evaluating the practical heat transfer problems via case studies.</td></tr><tr><td>Attitude</td><td>CLO4. Understanding of professional and ethical responsibility, a recognition of the need for, and an ability to engage in life-long learning</td></tr></table>	Skill	CLO2. Able to convert between the SI and metric units systems; and apply the accounting equation to mass and energy to formulate and solve steady and unsteady heat transfer problems. CLO3. Able to design individually and in groups heat exchangers, evaporators, boiling and condensation systems by analyzing given data and evaluating the practical heat transfer problems via case studies.	Attitude	CLO4. Understanding of professional and ethical responsibility, a recognition of the need for, and an ability to engage in life-long learning																												
Skill	CLO2. Able to convert between the SI and metric units systems; and apply the accounting equation to mass and energy to formulate and solve steady and unsteady heat transfer problems. CLO3. Able to design individually and in groups heat exchangers, evaporators, boiling and condensation systems by analyzing given data and evaluating the practical heat transfer problems via case studies.																																
Attitude	CLO4. Understanding of professional and ethical responsibility, a recognition of the need for, and an ability to engage in life-long learning																																
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> <u>Weight</u>: lecture session (2.5 hours) <u>Teaching levels</u>: I (Introduce); T (Teach); U (Utilize) <table><tr><th>No.</th><th>Topic</th><th>Weight</th><th>Level</th></tr><tr><td>1</td><td>Introduction</td><td>1</td><td>I,T,U</td></tr><tr><td>2</td><td>Conduction</td><td>1</td><td>T,U</td></tr><tr><td>3</td><td>Convection</td><td>3</td><td>T,U</td></tr><tr><td>4</td><td>Radiation</td><td>2</td><td>T,U</td></tr><tr><td>5</td><td>Boiling and Condensation</td><td>2</td><td>T,U</td></tr><tr><td>6</td><td>Heat Exchangers</td><td>3</td><td>T,U</td></tr><tr><td>7</td><td>Evaporators</td><td>3</td><td>T,U</td></tr></table>	No.	Topic	Weight	Level	1	Introduction	1	I,T,U	2	Conduction	1	T,U	3	Convection	3	T,U	4	Radiation	2	T,U	5	Boiling and Condensation	2	T,U	6	Heat Exchangers	3	T,U	7	Evaporators	3	T,U
No.	Topic	Weight	Level																														
1	Introduction	1	I,T,U																														
2	Conduction	1	T,U																														
3	Convection	3	T,U																														
4	Radiation	2	T,U																														
5	Boiling and Condensation	2	T,U																														
6	Heat Exchangers	3	T,U																														
7	Evaporators	3	T,U																														
Examination forms	<table><tr><td>☐ Multiple-choice questions</td><td>☐ Oral examination</td></tr><tr><td>☐ Report</td><td>☒ Written examination</td></tr><tr><td>☒ Presentation</td><td>☐ Others, please specify:</td></tr><tr><td>☐ Assignments</td><td></td></tr></table>	☐ Multiple-choice questions	☐ Oral examination	☐ Report	☒ Written examination	☒ Presentation	☐ Others, please specify:	☐ Assignments																									
☐ Multiple-choice questions	☐ Oral examination																																
☐ Report	☒ Written examination																																
☒ Presentation	☐ Others, please specify:																																
☐ Assignments																																	
Other requirements	<u>Attendance</u>: 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	I. Textbooks [1] Fundamentals of Heat & Mass Transfer by Incropera, DeWitt, Bergman, and Lavine – 6th Edition

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	5	3				3	
Skills (Level: 1-7)	2			3	3		4	
	3		4	3	3	4		
Attitudes (Level: 1-5)	4							3
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	5.0	3.5	3.0	3.0	4.0	3.5	3.0
L,M,H conversion*		H	M	M	M	M	M	M

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Introduction 1.1 Modes of heat transfer 1.1.1 Conduction 1.1.2 Convection 1.1.3 Radiation 1.2 Material properties of importance in heat transfer 1.2.1 Thermal conductivity 1.2.2 Specific heat capacity	1,2	Quiz 1	Lecture, Discussion, Inclass-Quiz	[1]
2.	2	Conduction: One Dimensional 2.1 Steady state conduction through constant area 2.2 Thermal contact resistance 2.3 Steady state heat conduction through a variable area	1,2	Quiz 2	Lecture, Inclass-Quiz, HW	[1]

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
		2.3.1 Cylinder 2.3.2 Sphere 2.4 Heat conduction in bodies with heat sources				
3.	3	Convective Heat Transfer: One dimensional 3.1 Principle of heat flow in fluids and concept of heat transfer coefficient 3.2 Individual and overall heat transfer coefficient 3.2.1 Heat transfer between fluids separated by a flat solid wall 3.2.2 Heat transfer between fluids separated by a cylindrical wall 3.3 Enhanced heat transfer: concept of fins 3.3.1 Analytical solution of different cases 3.3.2 Fin efficiency 3.4 Thermal insulation	1,2	Quiz 3	Lecture, Inclass-Quiz, HW	[1]
4.	4	Forced Convective Heat Transfer 4.1 Principle of convection 4.2 Forced convection mechanism: Flow over a flat horizontal plate 4.3 Flow through a pipe or tube 4.3.1 Turbulent flow 4.3.2 Laminar flow 4.3.3 Flow through a non-circular duct 4.3.4 Flow over a flat plate 4.3.5 Flow over cylinders and spheres 4.3.5.1 Flow across a cylinder 4.3.5.2 Flow across a sphere 4.3.5.3 Flow across a bank of tubes 4.4 Momentum and heat transfer analogies 4.4.1 Reynolds analogy 4.4.2 The Chilton-Colburn analogy 4.4.3 The Prandtl analogy 4.4.4 The Van Karman analogy	1,2	Quiz 4	Lecture, Inclass-Quiz, HW	[1]
5.	5	Heat Transfer by Natural Convection 5.1 Introduction 5.2 Empirical correlations for natural convective heat transfer 5.2.1 Natural convection around a flat vertical plate 5.2.2 Natural convection around a horizontal cylinder	1,2	Quiz 5	Lecture, Inclass-Quiz, HW	[1]

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
		5.2.3 Natural convection around a horizontal flat surface 5.2.4 Natural convection around sphere 5.2.5 Natural convection in enclosure 5.3 Combined natural and forced convection				
6.	6-8	Radiation Heat Transfer 6.1 Basic definition pertaining to radiation 6.1.1 Emissive power 6.1.2 Radiosity 6.1.3 Irradiation 6.1.4 Absorptivity, reflectivity, and transmissivity 6.2 Blackbody radiation 6.2.1 Planck's law 6.2.2 Wien's law 6.2.3 The Stefan-Boltzmann law for blackbody 6.2.4 Special characteristic of blackbody radiation 6.2.5 Kirchhoff's law 6.3 Grey body 6.4 Radiative heat exchanger between surfaces 6.4.1 View factor 6.4.2 Relation between view factors 6.5 Heat exchange between non blackbodies 6.6 Radiation shield 6.7 Electrical network for radiation through absorbing and transmitting medium 6.8 Radiation combined with conduction and convection	1,2	Quiz 6	Lecture, Inclass-Quiz, HW	[1]
7.	9	Midterm				
8.	11-12	Heat Transfer in Boiling and Condensation 7.1 Heat transfer during boiling 7.2 Boiling of saturated liquid 7.2.1 Nucleation boiling 7.2.2 Maximum heat flux 7.2.3 Film boiling 7.3 Heat transfer during condensation 7.4 Film condensation 7.5 Condensation for horizontal tube	3,4	Presentation, Group problems 1	Lecture, Group work, Presentation, assignment, design problems	[1]

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
		7.5.1 Condensation outside horizontal tube or bank of tube 7.5.1.1 Condensation on a single horizontal tube 7.5.1.2 Condensation on a vertical tube of N horizontal tubes 7.5.1.3 Condensation inside a horizontal tube 7.6 Condensation for packed and fluidized bed 7.6.1 Packed bed 7.6.2 Fluidized bed				
9.	13-14	Heat Exchangers 8.1 Elements of shell and tube heat exchanger 8.2 Thermal design of heat exchangers 8.2.1 Overall heat transfer coefficient 8.2.2 Fouling factor or dirt factor 8.2.2 Temperature profiles in heat exchangers 8.2.4 Why multi-pass exchangers 8.2.5 LMTD correction factor 8.2.6 Individual heat transfer coefficient 8.2.7 Pressure drop in the heat exchanger 8.2.7.1 Correlation for tube side pressure drop 8.2.7.2 Correlation for shell side pressure drop	3,4	Presentation, Group problems 2	Lecture, Group work, Presentation, assignment, design problems	[1]
10.	15-16	Evaporators 9.1 Solution properties 9.1.1 Concentration 9.1.2 Foaming 9.1.3 Degradation due to high temperature 9.1.4 Scaling 9.1.1 Equipment material 9.2 Evaporator 9.2.1 Natural circulation evaporator 9.2.2 Forced circulation evaporator 9.2.3 Falling film evaporator 9.3 Performance of steam heated tubular evaporators 9.3.1 Capacity and economy	3,4	Presentation, Group problems 3	Lecture, Group work, Presentation, assignment, design problems	[1]

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
		9.3.2 Single and multiple effect evaporators 9.3.3 Boiling point elevation 9.4 Temperature profile in an evaporators 9.5 Heat Transfer coefficient 9.6 Method of feeding: Multiple effect evaporators 9.7 Enthalpy balance 9.7.1 Single effect evaporator 9.7.2 Effect of heat of dilution 9.7.3 Multiple effect evaporator				
11.	17	Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
Quiz (10%)	Quiz 1-6 50% pass	Quiz 1-6 50% pass		
Presentation (10%)			Presentation 50% pass	Presentation 50% pass
Design Problems (10%)			Group problems 50% pass	Group problems 50% pass
Midterm Exam (30%)	Q1-17 50% pass	Q1-17 50% pass		
Final Exam (40%)	Q1-11 50% pass	Q1-11 50% pass	Q1-11 50% pass	Q1-11 50% pass

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

5. Rubrics (optional): No

6. Revision Date: May 20, 2023

Ho Chi Minh City, 20/5/2023

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Chemical Reaction Engineering

(Kỹ thuật phản ứng)

Course Code: CHE2061IU

1. General information

Course designation	The fundamentals of chemical kinetics, as well as reactor analysis and design, are covered in detail and in depth in this course. Chemical kinetics covers a variety of topics, including rate constants, reaction order, rate equations for both simple and complex processes, kinetic data analysis, and product distribution. The primary areas of research in reactor analysis and design concern the ideal reactor systems and configurations, such as batch reactors, plug flow reactors, and continuous stirred tank reactors. The final section of the course discusses homogeneous and heterogeneous catalytic reactions. The design component covers how to size such reactors, calculate conversion levels at various temperatures and pressures, and determine reaction kinetics from experimental data. It also covers how to choose the best reactor type and operating parameters to maximize the production of a desired product.			
Teaching schedule	☐ Year 1 ☐ Year 2 ☒ Year 3 ☐ Year 4 ☐ Year 5			
	☒ Semester 1 ☒ Semester 2 ☐ Summer			
Person In-Charge	Dr. Vu Bao Khanh, vbkhanh@hcmiu.edu.vn			
Language	English			
Relation to curriculum	☐ General ☒ Fundamental ☐ Specialization ☐ Project/Internship/Thesis		☒ Compulsory ☐ Elective	
	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar			

Teaching methods	Others, please specify:																																			
Workload	<table border="1"> <tr> <td></td><td></td><td>Lecture</td><td>Lab</td><td>Project</td><td>Internship</td><td>Thesis</td></tr> <tr> <td></td><td><i>Credit</i></td><td>3</td><td></td><td></td><td></td><td></td></tr> <tr> <td>Contact hours</td><td>37.5</td><td>37.5</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td>Self-Study hours</td><td>90</td><td>90</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td>Total workload</td><td>127.5</td><td>127.5</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> </table>			Lecture	Lab	Project	Internship	Thesis		<i>Credit</i>	3					Contact hours	37.5	37.5	0	0	0	0	Self-Study hours	90	90	0	0	0	0	Total workload	127.5	127.5	0	0	0	0
		Lecture	Lab	Project	Internship	Thesis																														
	<i>Credit</i>	3																																		
Contact hours	37.5	37.5	0	0	0	0																														
Self-Study hours	90	90	0	0	0	0																														
Total workload	127.5	127.5	0	0	0	0																														
Credit points	3																																			
Requirements for taking the course	☐ None ☐ Prerequisite course: ☐ Parallel course: ☒ Previous course: Reaction Kinetics and Catalysis (CHE2011IU); Physical Chemistry 2 (CHE1043IU); Mass Transfer Operations (CHE2041IU); Heat Transfer Operations (CHE2051IU)																																			
Course objectives	The course will begin with an introduction to the fundamental ideas of chemical kinetics and chemical reactor design as they relate to straightforward reaction systems. The general mole balance, reactor types, conversion, reactor sizing, rate laws, stoichiometry, and isothermal reactor design will all be covered. The concepts learned in the first half of the course will be expanded upon in the second half of the course as we describe real systems that deal with complex reactions and non-ideal reactors. Energy balances, multiple reactions, and reaction pathways, heterogeneous reactions, and non-isothermal reaction design are some of the topics that will be covered.																																			
Course learning outcomes	Upon the successful completion of this course, students will be able to: <table border="1"> <thead> <tr> <th>Competency level¹</th><th>Course learning outcome (CLO)</th></tr> </thead> <tbody> <tr> <td>Knowledge</td><td> CLO1. Design reactors for various types of chemical reactions and assess their performance. [Creating] CLO2. Identify the effects of mass transfer, heat transfer, fluid flow, and reaction conditions on the performance of chemical reactors. [Remembering] CLO3. Evaluate the efficiency of industrial chemical reactors through the calculation of reaction yields, selectivity, and conversion. [Evaluate] </td></tr> </tbody> </table>	Competency level ¹	Course learning outcome (CLO)	Knowledge	CLO1. Design reactors for various types of chemical reactions and assess their performance. [Creating] CLO2. Identify the effects of mass transfer, heat transfer, fluid flow, and reaction conditions on the performance of chemical reactors. [Remembering] CLO3. Evaluate the efficiency of industrial chemical reactors through the calculation of reaction yields, selectivity, and conversion. [Evaluate]																															
Competency level ¹	Course learning outcome (CLO)																																			
Knowledge	CLO1. Design reactors for various types of chemical reactions and assess their performance. [Creating] CLO2. Identify the effects of mass transfer, heat transfer, fluid flow, and reaction conditions on the performance of chemical reactors. [Remembering] CLO3. Evaluate the efficiency of industrial chemical reactors through the calculation of reaction yields, selectivity, and conversion. [Evaluate]																																			

	Skill	CLO4. Utilize computer-aided tools and software for reactor design, simulation, and analysis. [Guided response]
	Attitude	CLO5. Realize the societal and environmental impacts of chemical reactions, and apply ethical considerations in reaction engineering design [Organization]

¹ Level of competence according to Bloom's Taxonomy:

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x
Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination
Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x

Content

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

Weight: lecture session (2.5 hours)

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

No.	Topic	Weight	Level
1	Mole Balance	1	I, T
2	Rate Laws	2	T, U
3	Stoichiometry	1	T, U
4	Review Mole Balance, Rate Laws, Stoichiometry	2	T
5	Isothermal Reactors and Examples	2	T, U
6	Pressure Drop in Packed Bed Reactors	2	T
7	Membrane reactor	1	T, U
8	Semibatch Reactor	1	T, U
9	Multiple Reactions	0.5	I, T
10	Enzymatic Reactions and Bioreactors	0.5	I, T
11	Deducing Mechanisms Example Problems		
12	Nonisothermal Reactors		

Examination forms	☐ Multiple-choice questions ☐ Oral examination ☐ Report ☒ Written examination ☐ Presentation ☐ Others, please specify: ☐ Assignments
Other requirements	<u>Attendance:</u> 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. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.
Reading list	I. Textbooks [1] H. Scott Fogler, Elements of Chemical Reaction Engineering, 5th edition, Prentice Hall 2016. [II. References] 2] Warren L. McCabe, Julian Smith, Peter Harriott, Unit Operations of Chemical Engineering, McGraw-Hill Education 2005. [3] Don W. Green, Robert H. Perry, Perry's Chemical Engineers' Handbook, 8th Ed., McGraw-Hill 2007.

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	6						
	2	1						
	3	5						
Skills (Level: 1-7)	4					3		
Attitudes (Level: 1-5)	5							4
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	4.0	0.0	0.0	0.0	3.0	0.0	4.0
L,M,H conversion*		H				M		H

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Mole Balance	1	HW	Lecture	
2.	2	Rate Laws	1	HW	Lecture	
3.	3&4	Stoichiometry	1	HW	Lecture	
4.	5	Review Mole Balance, Rate Laws, Stoichiometry	1	HW	Lecture	
5.	6	Isothermal Reactors and Examples	1,3	HW	Lecture	
6.	7&8	Pressure Drop in Packed Bed Reactors	1,2,3	HW	Lecture	
7.	9-10	Midterm				
8.	11	Membrane reactor	2,3	HW	Lecture	
9.	12	Semibatch Reactor	2,3	HW	Lecture	
10.	13&14	Multiple Reactions	1	HW	Lecture	
11.	15	Enzymatic Reactions and Bioreactors	1,3	HW	Lecture	
12.	16	Deducing Mechanisms Example Problems	1	HW	Lecture	
13.	17	Nonisothermal Reactors	1,2	HW	Lecture	
14.	18	Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
Homework (30%)	50%pass	50%pass		
Midterm exam (30%)	50%pass			
Final exam (40%)		50%pass	50%pass	

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

5. Rubrics (optional): No

6. Revision Date: May 20, 2023

Ho Chi Minh City, 20/5/2023

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: MECHANICAL UNIT OPERATIONS

(Các quá trình và thiết bị cơ học)

Course Code: CHE2071IU

1. General information

Course designation	In chemical engineering processes, it is quite common that one must deal with fluids and solid particles in mixtures. In this course, students are provided with the basic knowledge of chemical engineering in fluid mechanics and mechanical process operations for heterogeneous systems. This subject is a vital part of background for a chemical engineer. <i>Trong các quy trình kỹ thuật hóa học, việc làm việc với chất lỏng và hạt rắn trong hỗn hợp là khá phổ biến. Trong môn học này, sinh viên được cung cấp kiến thức cơ bản về kỹ thuật hóa học trong cơ học chất lỏng và hoạt động quá trình cơ khí cho các hệ thống không đồng nhất. Môn học này là một phần quan trọng trong nền tảng của một kỹ sư hóa học.</i>		
Teaching schedule	☐ Year 1 ☐ Year 2 ☒ Year 3 ☐ Year 4 ☐ Year 5 ☐ Semester 1 ☒ Semester 2 ☐ Summer		
Person In-Charge	Dr. Doan Hoai Linh, dhlhinh@hcmiu.edu.vn Template: (Name in Vietnamese order), (Email)		
Language	English		
Relation to curriculum	☐ General ☐ Fundamental ☐ Specialization ☐ Project/Internship/Thesis	☒ Compulsory ☐ Elective	
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify:		

Workload			Lecture	Lab	Project	Internship	Thesis
		Credit	3				
	Contact hours	37.5	37.5	0	0	0	0
	Self-Study hours	90	90	0	0	0	0
	Total workload	127.5	127.5	0	0	0	0
Credit points	3						
Requirements for taking the course	☐ None ☐ Prerequisite course: <i>(Please specify course ID & course title, if any)</i> ☐ Parallel course: <i>(Please specify course ID & course title, if any)</i> ☒ Previous course: <i>(Please specify course ID & course title, if any)</i> CHE2051IU Heat Transfer Operations, CHE1031IU Physical Chemistry 1, CHE2041IU Mass Transfer Operations						
Course objectives	Students know understand the fundamentals of solid particles to apply in chemical engineering, including particles propertiesand its important role in mechanical unit operations Students know how to select suitable equipment to transport fluids. The design of the system is mainly the calculation of the basic specifications of pumps (for liquids) or blowers (for gases) in given pipeline from a given place to another. Students know how to calculate basic specifications of agitation systems. They know the classification of impeller types and their geometrical factors. Student can calculate the terminal velocity of a fluid flow in which a given particle can be floated. Hereby, students understand the principles of designing settling or sedimentation equipment to separate dispersed phases from continuous phases. Students know how to calculate critical velocity of a fluid flow to bring a bulk of solid particles into fluidized bed, and they can figure out the working conditions of a given fluidized bed. Students can classify different types of filtration and how to build the filtration equation from theoretical data or experimental data. Students can differentiate and apply specific memberanes in extraction processes						
Course learning outcomes	Upon the successful completion of this course, students will be able to:						
	Competency level	Course learning outcome (CLO)					

	Knowledge	CLO1. When given a complex particulate solids and fluids separation problem using mechanical unit operations only, able to identify, formulate and solve problems by applying various separation methods such as screening, filtration, sedimentation...																																		
	Skill	CLO2. Able to analyze solid particle size and calculate the terminal velocity of a floating solid particle inside a fluid flow CLO3. Able to design individually and in groups filtration, sedimentation, floatation, and transportation and metering of fluids such as pipe, fitting, valves, pumps, blowers, compressors, full-bore meters, insertion meters, agitation and mixing process, and membrane separation via case studies																																		
	Attitude	CLO4. Understanding of professional and ethical responsibility, a recognition of the need for, and an ability to engage in life-long learning																																		
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> <u>Weight</u>: lecture session (2.5 hours) <u>Teaching levels</u>: I (Introduce); T (Teach); U (Utilize) <table><tr><th>No.</th><th>Topic</th><th>Weight</th><th>Level</th></tr><tr><td>1</td><td>Introduction, fundamentals of fluids and solid particles</td><td>1</td><td>I,T,U</td></tr><tr><td>2</td><td>Screening</td><td>2</td><td>T,U</td></tr><tr><td>3</td><td>Storage and conveying of bulk solids</td><td>1</td><td>T,U</td></tr><tr><td>4</td><td>Flow past immersed solid objects, fluids, packed and fluidized beds</td><td>3</td><td>T,U</td></tr><tr><td>5</td><td>Filtration</td><td>2</td><td>T,U</td></tr><tr><td>6</td><td>Sedimentation</td><td>2</td><td>T,U</td></tr><tr><td>7</td><td>Transportation and metering of fluids</td><td>4</td><td>T,U</td></tr></table>				No.	Topic	Weight	Level	1	Introduction, fundamentals of fluids and solid particles	1	I,T,U	2	Screening	2	T,U	3	Storage and conveying of bulk solids	1	T,U	4	Flow past immersed solid objects, fluids, packed and fluidized beds	3	T,U	5	Filtration	2	T,U	6	Sedimentation	2	T,U	7	Transportation and metering of fluids	4	T,U
No.	Topic	Weight	Level																																	
1	Introduction, fundamentals of fluids and solid particles	1	I,T,U																																	
2	Screening	2	T,U																																	
3	Storage and conveying of bulk solids	1	T,U																																	
4	Flow past immersed solid objects, fluids, packed and fluidized beds	3	T,U																																	
5	Filtration	2	T,U																																	
6	Sedimentation	2	T,U																																	
7	Transportation and metering of fluids	4	T,U																																	
Examination forms	☐ Multiple-choice questions ☐ Oral examination ☐ Report ☒ Written examination																																			

	☒ Presentation ☐ Others, please specify: ☐ Assignments
Other requirements	<u>Attendance:</u> 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. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.
Reading list	I. Textbooks [1] Warren McCabe, Julian Smith, Peter Harriott, Unit Operations of Chemical Engineering, 8th edition, McGraw Hill, 2012. [2] Swain, Mechanical Operations, 1st Ed., Tata McGraw-Hill Education, 2013.

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	5	3				3	
Skills (Level: 1-7)	2			3	3		3	
	3		4	3	3	4	3	
Attitudes (Level: 1-5)	4							3
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	5.0	3.5	3.0	3.0	4.0	3.0	3.0
L,M,H conversion*		H	M	M	M	M	M	M

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Introduction to mechanical unit operations Particulate solids: particle size, shape, and density	1	Quiz 1	Lecture, Discussion, Inclass-Quiz	[1],[2]

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
2.	2-4	Screening, size analysis by screening, screening equipments, effectiveness and capacity Size reduction: methods, crushers, grinders Size enlargement: methods, equipments, granulators Storage and conveying of bulk solids	2	Quiz 2-6	Lecture, Inclass-Quiz	[1],[2]
3.	5-8	Flow past immersed solid objects and fluids Flow through packed and fluidized beds	2	Quiz 7-8	Lecture, Inclass-Quiz	[1],[2]
4.	9	Midterm				
5.	11-12	Filtration: cake filtration, equipment, cross flow	3, 4	Presentation, Group problems 1	Lecture, Group work, Presentation, assignment, design problems	[1],[2]
6.	13-14	Sedimentation: classifiers, design of thickeners, centrifugal separations Flotation	3, 4	Presentation, Group problems 1	Lecture, Group work, Presentation, assignment, design problems	[1],[2]
7.	15-16	Transportation and metering of fluids: pipe, fittings, valves, pumps, fans, blowers, compressors, full-bore meters, insertion meters Agitation and mixing of liquids: circulation, velocities, power consumption in agitated vessels, blending, mixing, suspension of solid particles, dispersion operations Membrane separation processes: separation of gases, liquids, dialysis, liquid-liquid extraction, pervaporation, reverse osmosis	3, 4	Presentation, Group problems 1	Lecture, Group work, Presentation, assignment, design problems	[1],[2]
8.	17	Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
Quiz (10%)	Quiz 1-8 50% pass	Quiz 1-8 50% pass		
Presentation (10%)			Presentation 50% pass	Presentation 50% pass
Design Problems (10%)			Group problems 50% pass	Group problems 50% pass
Midterm Exam (30%)	Q1-5 50% pass	Q1-5 50% pass		
Final Exam (40%)	Q1-10 50% pass	Q1-10 50% pass	Q1-10 50% pass	Q1-10 50% pass

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

5. Rubrics (optional): No

6. Revision Date: May 20, 2023

Ho Chi Minh City, 20/5/2023

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Occupational Health Safety and Environment (HSE)

(An toàn sức khỏe nghề nghiệp và môi trường)

Course Code: CHE2081IU

1. General information

Course designation	The course is to introduce students to the application of health safety and environment (HSE) concepts in engineering. It emphasizes mainly the management of risk associated with any hazardous products and processes throughout its life cycle. Generally, implementing an HSE program is to minimize and control the risks that come from any hazards of products and processes. This makes HSE an integral part of any engineering discipline.		
Teaching schedule	☐ Year 1 ☐ Year 2 ☒ Year 3 ☐ Year 4 ☐ Year 5 ☐ Semester 1 ☒ Semester 2 ☐ Summer		
Person In-Charge	Dr. Phùng Thanh Khoa, ptkhoa@hcmiu.edu.vn		
Language	English		
Relation to curriculum	☐ General ☐ Fundamental ☒ Specialization ☐ Project/Internship/Thesis	☐ Compulsory ☐ Elective	
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify:		

Workload			Lecture	Lab	Project	Internship	Thesis
		<i>Credit</i>	2				
	Contact hours	25	25	0	0	0	0
	Self-Study hours	60	60	0	0	0	0
	Total workload	85	85	0	0	0	0
Credit points	2						
Requirements for taking the course	☒ None ☐ Prerequisite course: <i>(Please specify course ID & course title, if any)</i> ☐ Parallel course: <i>(Please specify course ID & course title, if any)</i> ☐ Previous course: <i>(Please specify course ID & course title, if any)</i>						
Course objectives	Upon successful completion of this course, the students should: • Demonstrate an understanding of product handling and management; principles of process system engineering and environment management. • Demonstrate knowledge of dangerous and risky components in a given system or work environment. • Demonstrate knowledge of HSE system.						
Course learning outcomes	Upon the successful completion of this course, students will be able to:						
	Competency level¹	Course learning outcome (CLO)					
	Knowledge	CLO1. Be able to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and environmental [Applying].					

^{1 1} Level of competence according to Bloom's Taxonomy:

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x
Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination
Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x

		CLO2. Be able to identify the potentially dangerous and risky components in a given system or work environment [Evaluating].																												
	Skill	CLO3. Be able to perform safe and workplace practices [Mechanism].																												
	Attitude	CLO4. Be able to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts [Valuing].																												
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> <u>Weight</u>: lecture session (2.5 hours) <u>Teaching levels</u>: I (Introduce); T (Teach); U (Utilize) <table><tr><th>No.</th><th>Topic</th><th>Weight</th><th>Level</th></tr><tr><td>1</td><td>Introduction to Health Safety and Environment</td><td>1</td><td>I, T</td></tr><tr><td>2</td><td>Product Handling and Management: Product stewardship, product information guidelines (MSDS, CAS, EINECS, PICCS), toxic and hazardous materials, GMP, HACCP.</td><td>1</td><td>I, T, U</td></tr><tr><td>3</td><td>Principles of Process Safety Engineering: Process and system safety (i.e. reactor; storage tank, pressure relief system, etc.), construction safety, equipment safety, fire and explosion, prevention of fires and explosions</td><td>1.5</td><td>I, T, U</td></tr><tr><td>4</td><td>Chemical reactivity</td><td>0.5</td><td>I, T, U</td></tr><tr><td>5</td><td>Principles of Environmental Engineering: Pollution prevention, air pollution engineering, waste treatment and disposal technologies, storage and containment.</td><td>1</td><td>I, T, U</td></tr><tr><td>6</td><td>Principles of Occupational Health and Industrial Hygiene: Chemical handling and hazard assessment (i.e. toxicity levels, OELs), personal protective equipment, equipment safety</td><td>1</td><td>I, T, U</td></tr></table>		No.	Topic	Weight	Level	1	Introduction to Health Safety and Environment	1	I, T	2	Product Handling and Management: Product stewardship, product information guidelines (MSDS, CAS, EINECS, PICCS), toxic and hazardous materials, GMP, HACCP.	1	I, T, U	3	Principles of Process Safety Engineering: Process and system safety (i.e. reactor; storage tank, pressure relief system, etc.), construction safety, equipment safety, fire and explosion, prevention of fires and explosions	1.5	I, T, U	4	Chemical reactivity	0.5	I, T, U	5	Principles of Environmental Engineering: Pollution prevention, air pollution engineering, waste treatment and disposal technologies, storage and containment.	1	I, T, U	6	Principles of Occupational Health and Industrial Hygiene: Chemical handling and hazard assessment (i.e. toxicity levels, OELs), personal protective equipment, equipment safety	1	I, T, U
No.	Topic	Weight	Level																											
1	Introduction to Health Safety and Environment	1	I, T																											
2	Product Handling and Management: Product stewardship, product information guidelines (MSDS, CAS, EINECS, PICCS), toxic and hazardous materials, GMP, HACCP.	1	I, T, U																											
3	Principles of Process Safety Engineering: Process and system safety (i.e. reactor; storage tank, pressure relief system, etc.), construction safety, equipment safety, fire and explosion, prevention of fires and explosions	1.5	I, T, U																											
4	Chemical reactivity	0.5	I, T, U																											
5	Principles of Environmental Engineering: Pollution prevention, air pollution engineering, waste treatment and disposal technologies, storage and containment.	1	I, T, U																											
6	Principles of Occupational Health and Industrial Hygiene: Chemical handling and hazard assessment (i.e. toxicity levels, OELs), personal protective equipment, equipment safety	1	I, T, U																											

		(ventilation, radiation and noise hazard), and ergonomics.		
	7	Risk Management: Hazard identification, risk assessment, mitigation and control. Hazard evaluation, exposure assessment (quantification), risk characterization (qualification) and accident probability (i.e. hardware and operator failure, event trees and fault trees).	1	I, T, U
	8	Introduction to the law in occupational safety and hygiene	1	I, T, U
	9	Factory field trip	1	I, T, U
	10	Factory field trip	1	I, T, U
Examination forms	☐ Multiple-choice questions ☐ Oral examination ☐ Report ☒ Written examination ☐ Presentation ☐ Others, please specify: ☐ Assignments			
Other requirements	<u>Attendance:</u> 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. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.			
Reading list	I. Textbooks [1] T.S.S. Dikshith, <i>Handbook of Chemicals and Safety</i>, 2017, CRC Press, 2017. [2] Daniel Crowl and Joseph F. Louvar, <i>Chemical Process Safety</i>, Prentice Hall, 3rd edition, 2011. II. References 			

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	5						
	2		3					
	3							
Skills (Level: 1-7)	4							
	5							
	6						4	
Attitudes (Level: 1-5)	7							3
	8							
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	5.0	3.0	0.0	0.0	0.0	4.0	3.0
L,M,H conversion*		H	M				H	M

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Introduction to Health Safety and Environment	1, 4		Lecture, Discussion	[1]. [2].
2.	2	Product Handling and Management: Product stewardship, product information guidelines (MSDS, CAS, EINECS, PICCS), toxic and hazardous materials, GMP, HACCP.	1,2, 3, 4	HW1	Lecture, HW	[1]. [2].
3.	3	Principles of Process Safety Engineering: Process and system safety (i.e. reactor; storage tank, pressure relief system, etc.), construction safety, equipment safety, fire and explosion, prevention of fires and explosions	1,2, 3, 4	Quiz 1	Lecture, Inclass-Quiz	[1]. [2].
4.	4	Chemical reactivity	1,2, 3, 4	HW2, Group work	Lecture, Group work, HW	[1]. [2].

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
5.	5	Principles of Environmental Engineering: Pollution prevention, air pollution engineering, waste treatment and disposal technologies, storage and containment.	1, 2,3, 4	Quiz 2	Lecture, Inclass-Quiz	[1]. [2].
6.	6	Principles of Occupational Health and Industrial Hygiene: Chemical handling and hazard assessment (i.e. toxicity levels, OELs), personal protective equipment, equipment safety (ventilation, radiation and noise hazard), and ergonomics.	1,2, 3, 4	Quiz 3	Lecture, Inclass-Quiz	[1]. [2].
7.	7	Risk Management: Hazard identification, risk assessment, mitigation and control. Hazard evaluation, exposure assessment (quantification), risk characterization (qualification) and accident probability (i.e. hardware and operator failure, event trees and fault trees).	1,2, 3, 4	HW3, Group work	Lecture, Group work, HW	[1]. [2].
8.	8	Introduction to the law in occupational safety and hygiene	1,2, 4	Group work	Lecture, Group work	
9.	9	Midterm				
10.	11,12	Factory Field trip	1,2, 3, 4	Report	Visiting	
11.	18	Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
In-class exercises/quizzes/ Homework exercises (10%)	HW1, Qz 1 60%Pass	HW2, Qz 2 60%Pass		HW3, Qz 3 60%Pass
Group work (20%)	50%Pass	50%Pass	50%Pass	50%Pass
Midterm exam (30%)		Q3 50%Pass	Q1, Q2 50%Pass	
Final exam (40%)	Part I 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): No

6. Revision Date: May 20, 2023

Ho Chi Minh City, 20/5/2023

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	An ability to identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	An ability to communicate (in English) effectively with a range of audiences
4	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: CHEMICAL ENGINEERING LAB

(Kỹ thuật Hóa học Thí nghiệm)

Course Code: CHE1012IU

1. General information

Course designation	This course is designed for students pursuing a degree in chemical engineering and provides professional skills in applying fundamentals of chemical engineering via experimentation. <i>Môn học này được thiết kế dành cho sinh viên theo học chương trình kỹ sư hóa học và cung cấp các kỹ năng chuyên nghiệp trong việc áp dụng những kiến thức cơ bản của kỹ thuật hóa học thông qua thực nghiệm.</i>		
Teaching schedule	☐ Year 1 ☐ Year 2 ☐ Year 3 ☒ Year 4 ☐ Year 5 ☐ Semester 1 ☒ Semester 2 ☐ Summer		
Person In-Charge	Dr. Vu Bao Khanh, vbkhanh@hcmiu.edu.vn Template: (Name in Vietnamese order), (Email)		
Language	English		
Relation to curriculum	☐ General ☒ Fundamental ☐ Specialization ☐ Project/Internship/Thesis	☒ Compulsory ☐ Elective	
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify: Experiment, report		

Workload			Lecture	Lab	Project	Internship	Thesis								
		<i>Credit</i>	0	1											
	Contact hours	25	0	25	0	0	0								
	Self-Study hours	30	0	30	0	0	0								
	Total workload	55	0	55	0	0	0								
Credit points	1														
Requirements for taking the course	☐ None ☐ Prerequisite course: <i>(Please specify course ID & course title, if any)</i> ☐ Parallel course: <i>(Please specify course ID & course title, if any)</i> ☒ Previous course: <i>(Please specify course ID & course title, if any)</i> CHE2051IU Heat Transfer Operations, CHE1031IU Physical Chemistry 1, CHE2041IU Mass Transfer Operations														
Course objectives	Students will be provided professional skills and techniques to understand fully and apply fundamentals of chemical engineering in various instruments/ machinery in different aspects such as reactions, heat transfer, mass transfer, etc.														
Course learning outcomes	Upon the successful completion of this course, students will be able to: <table border="1" style="width: 100%;"> <thead> <tr> <th>Competency level</th> <th>Course learning outcome (CLO)</th> </tr> </thead> <tbody> <tr> <td>Knowledge</td> <td>CLO1. Understand and apply chemical engineering principles in various instruments</td> </tr> <tr> <td>Skill</td> <td>CLO2. Conduct experiments of fixed and fluidized bed, gas absorption, dryer, heat exchanger and jacketed reactor CLO3. Perform analytical results and write scientific report of experiments and explain the results using chemical engineering principles</td> </tr> <tr> <td>Attitude</td> <td>CLO4. Practice experiments of chemical engineering in a safe and ethical manner.</td> </tr> </tbody> </table>							Competency level	Course learning outcome (CLO)	Knowledge	CLO1. Understand and apply chemical engineering principles in various instruments	Skill	CLO2. Conduct experiments of fixed and fluidized bed, gas absorption, dryer, heat exchanger and jacketed reactor CLO3. Perform analytical results and write scientific report of experiments and explain the results using chemical engineering principles	Attitude	CLO4. Practice experiments of chemical engineering in a safe and ethical manner.
Competency level	Course learning outcome (CLO)														
Knowledge	CLO1. Understand and apply chemical engineering principles in various instruments														
Skill	CLO2. Conduct experiments of fixed and fluidized bed, gas absorption, dryer, heat exchanger and jacketed reactor CLO3. Perform analytical results and write scientific report of experiments and explain the results using chemical engineering principles														
Attitude	CLO4. Practice experiments of chemical engineering in a safe and ethical manner.														
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> <u>Weight</u>: lecture session (5 hours/eight) <u>Teaching levels</u>: I (Introduce); T (Teach); U (Utilize) <table border="1" style="width: 100%;"> <thead> <tr> <th>No.</th> <th>Topic</th> <th>Weight</th> <th>Level</th> </tr> </thead> <tbody> </tbody> </table>							No.	Topic	Weight	Level				
No.	Topic	Weight	Level												

	1	Fixed and Fluidized bed	1	T
	2	Gas absorptbion	1	T
	3	Computer controlled tray dryer	1	T
	4	Tube-in-tube heat exchanger	1	T
	5	Jacketed reactor	1	T
Examination forms	☐ Multiple-choice questions ☐ Oral examination ☒ Report ☒ Written examination ☐ Presentation ☒ Others, please specify: Lab work ☐ Assignments			
Other requirements	<u>Attendance:</u> 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. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.			
Reading list	I. Textbooks			

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	5	3				3	3
Skills (Level: 1-7)	2			3	3	4	3	3
	3		4	3	3	4	3	
Attitudes (Level: 1-5)	4						3	3
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	5.0	3.5	3.0	3.0	4.0	3.0	3.0
L,M,H conversion*		H	M	M	M	M	M	M

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Fixed and fluidized bed apparatus	1-4	Report 1	Discussion, Experiment, Write report	
2.	2	Gas absorption column	1-4	Report 2	Discussion, Experiment, Write report	
3.	3	Computer controlled tray dryer	1-4	Report 3	Discussion, Experiment, Write report	
4.	4	Tube-in-tube heat exchanger L-L	1-4	Report 4	Discussion, Experiment, Write report	
5.	5	Jacketed reactor	1-4	Report 5	Discussion, Experiment, Write report	
6.	6	Final examination	1-4			

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
Lab work (70%)	Report 1-4 70% pass	Report 1-4 70% pass	Report 1-4 70% pass	Report 1-4 70% pass
Final exam (30%)	Q1-10 50% pass	Q1-10 50% pass	Q1-10 50% pass	Q1-10 50% pass

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

5. Rubrics (optional):

6. Revision Date: May 20, 2023

Ho Chi Minh City, 20/5/2023

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



**VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY**
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Chemical Process Design and Simulation
(Thiết kế và mô phỏng quá trình hóa học)
Course Code: CHE2092IU

1. General information

Course designation	To study the modeling & simulation techniques of chemical processes and to gain skills in using process simulators.																																								
Teaching schedule	☐ Year 1 ☐ Year 2 ☐ Year 3 ☒ Year 4 ☐ Year 5																																								
	☐ Semester 1 ☒ Semester 2 ☐ Summer																																								
Person In-Charge																																									
Language	English																																								
Relation to curriculum	☐ General ☐ Fundamental ☒ Specialization ☐ Project/Internship/Thesis			☒ Compulsory ☐ Elective																																					
Teaching methods	☐ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify: LAB																																								
Workload	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th><th></th><th>Lecture</th><th>Lab</th><th>Project</th><th>Internship</th><th>Thesis</th></tr> </thead> <tbody> <tr> <td></td><td><i>Credit</i></td><td style="text-align: center;">0</td><td style="text-align: center;">3</td><td></td><td></td><td></td></tr> <tr> <td>Contact hours</td><td style="text-align: center;">75</td><td style="text-align: center;">0</td><td style="text-align: center;">75</td><td style="text-align: center;">0</td><td style="text-align: center;">0</td><td style="text-align: center;">0</td></tr> <tr> <td>Self-Study hours</td><td style="text-align: center;">90</td><td style="text-align: center;">0</td><td style="text-align: center;">90</td><td style="text-align: center;">0</td><td style="text-align: center;">0</td><td style="text-align: center;">0</td></tr> <tr> <td>Total workload</td><td style="text-align: center;">165</td><td style="text-align: center;">0</td><td style="text-align: center;">165</td><td style="text-align: center;">0</td><td style="text-align: center;">0</td><td style="text-align: center;">0</td></tr> </tbody> </table>								Lecture	Lab	Project	Internship	Thesis		<i>Credit</i>	0	3				Contact hours	75	0	75	0	0	0	Self-Study hours	90	0	90	0	0	0	Total workload	165	0	165	0	0	0
		Lecture	Lab	Project	Internship	Thesis																																			
	<i>Credit</i>	0	3																																						
Contact hours	75	0	75	0	0	0																																			
Self-Study hours	90	0	90	0	0	0																																			
Total workload	165	0	165	0	0	0																																			

Credit points	3						
Requirements for taking the course	☐ None ☐ Prerequisite course: ☐ Parallel course: ☒ Previous course: Reaction Kinetics and Catalysis (CHE2011IU); Chemical Reaction Engineering (CHE2061IU); Mass Transfer Operations (CHE2041IU); Heat Transfer Operations (CHE2051IU); Mechanical Unit Operations (CHE2071IU)						
Course objectives	The goal of this course is to design and replicate an actual industrial procedure by utilizing open-source process simulation software. The process entails selecting appropriate units such as reactions and separation methods, fine-tuning operational parameters for optimization, and assessing the performance of these units based on criteria specified in the set requirements, such as production, selectivity, efficiency, and more. After determining these parameters, students will need to assess the economic viability of the studied process and relevant bibliographic data.						
Course learning outcomes	Upon the successful completion of this course, students will be able to:						
	Competency level ¹		Course learning outcome (CLO)				
	Knowledge		CLO1. Apply the fundamentals of process simulation, including mass and energy balances, thermodynamics, fluid mechanics, and reaction engineering. [Apply] CLO2. Design and optimize chemical processes, unit operations, and systems by developing and comparing different scenarios. [Creating] CLO3. Evaluate and compare the economic and environmental impact of different process alternatives, including scaling-up and down. [Evaluate]				
	Skill		CLO4. Adapt effectively with others to design and optimize chemical processes that align with business and operational needs. [Adapt] CLO5. Communicate technical information, analyze results, and make processes recommendations effectively to team members, stakeholders, and decision-makers. [Set]				
	Attitude		CLO6. Demonstrate a strong appreciation of the importance of safety, security, and ethical considerations in the design and implementation of chemical processes. [Valuing]				
Level of competence according to Bloom's Taxonomy:							
	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7

Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x								
Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination								
Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x								
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i>														
	<u>Weight:</u> lecture session (2.5 hours)														
	<u>Teaching levels:</u> I (Introduce); T (Teach); U (Utilize)														
	No.	Topic	Weight	Level											
	1	Material Balances in Nonreacting Systems - Seawater desalination - Simple distillation - Solvent extraction - Azeotrope distillation - Distillation with reflux - Four-stage evaporation system	1	T, U											
	2	Species Balances in Reacting Systems - Equilibrium reaction - Conversion reaction - Multiple conversion reactions	2	T, U											
	3	Energy Balance for Nonreacting Systems - Heater – Cooler - Mixer	1	T, U											
	4	Energy Balance for Reacting Systems Heat of conversion reaction	2	T, U											
Examination forms	<table><tr><td>☐ Multiple-choice questions</td><td>☐ Oral examination</td></tr><tr><td>☒ Report</td><td>☐ Written examination</td></tr><tr><td>☐ Presentation</td><td>☐ Others, please specify:</td></tr><tr><td>☐ Assignments</td><td></td></tr></table>							☐ Multiple-choice questions	☐ Oral examination	☒ Report	☐ Written examination	☐ Presentation	☐ Others, please specify:	☐ Assignments	
	☐ Multiple-choice questions	☐ Oral examination													
	☒ Report	☐ Written examination													
☐ Presentation	☐ Others, please specify:														
☐ Assignments															
Other requirements	<u>Attendance:</u> 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.														
	<u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.														
Reading list	I. Textbooks														

	Lab manual II. References DWSIM User Guide: https://dwsim.org/ Coco Simulation: https://www.cocosimulator.org/ Tutorials: https://www.youtube.com/c/DWSIMSimulator Learn Aspen Plus in 24 Hours, Second Edition Using Aspen Plus in Thermodynamics Instruction: A Step-by-Step Guide 1st Edition

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-6) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	3						
	2	6						
	3	5						
Skills (Level: 1-7)	4				6			
	5					2		
Attitudes (Level: 1-5)	6							3
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	4.7	0.0	0.0	6.0	2.0	0.0	3.0
L,M,H conversion*		H			H	L		M

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Tutorials	1		Lecture	
2.	2	Tutorials	1		Lecture	
3.	3	-Seawater desalination -Simple distillation	1,2, 3	Pre-lab Report	Lecture Lab	
4.	4	-Solvent extraction -Azeotrope distillation	1,2, 3	Pre-lab Report	Lecture Lab	
5.	5	-Distillation with reflux -Four-stage evaporation system	1,2, 3	Pre-lab Report	Lecture Lab	

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
6.	6	-Equilibrium reaction -Conversion reaction	1,2, 3	Pre-lab Report	Lecture Lab	
7.	7	-Multiple conversion reactions	1,2, 3	Pre-lab	Lecture Lab	
8.	8	-Heater – Cooler -Mixer	1,2, 3	Report	Lecture Lab	
9.	9	-Heat of conversion reaction	1,2, 3	Pre-lab	Lecture Lab	
10.	10	-Isothermal flash -Reaction and separation	1,2, 3	Report	Lecture Lab	
11.	11	Special projects	1,2, 3,4, 5	Pre-lab	Lecture Lab	
12.	12	Special projects	1,2, 3,4, 5	Report	Lecture Lab	
13.	13	Special projects	1,2, 3,4, 5	Pre-lab	Lecture Lab	
14.	14	Special projects	1,2, 3,4, 5	Report	Lecture Lab	
15.	15	Special projects	1,2, 3,4, 5	Pre-lab	Lecture Lab	
16.	18	Final evaluation				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4	CLO5	CLO6
Lab report (50%)	>50% pass	>50% pass	>50% pass			
Midterm evaluation (25%)	>50% pass	>50% pass	>50% pass			
Final evaluation (25%)	>50% pass	>50% pass	>50% pass			

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

5. Rubrics (optional): No

6. Revision Date: May 20, 2023

	Ho Chi Minh City, 20/5/2023 Dean of School of Chemical and Environmental Engineering  Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No .	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Green Chemical Engineering

(Kỹ thuật hóa học xanh)

Course Code: CHE3111IU

1. General information

Course designation	This course will introduce students with green chemical engineering in order to devise new technologies and methods of chemical processing that generate little or no pollution and also promote the practice of more sustainable engineering options. In particular, designing a chemical reactor to achieve maximum performance is the key for waste minimization. The course will focus on the principles of chemical reaction engineering with some key factors which influence reactor performance will be introduced.		
Teaching schedule	☐ Year 1 ☐ Year 2 ☐ Year 3 ☒ Year 4 ☐ Year 5 ☒ Semester 1 ☐ Semester 2 ☐ Summer		
Person In-Charge	Dr. Phùng Thanh Khoa, ptkhoa@hcmiu.edu.vn		
Language	English		
Relation to curriculum	☐ General ☐ Fundamental ☒ Specialization ☐ Project/Internship/Thesis	☐ Compulsory ☒ Elective	
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify:		

Workload			Lecture	Lab	Project	Internship	Thesis
		<i>Credit</i>	3				
	Contact hours	37.5	37.5	0	0	0	0
	Self-Study hours	90	90	0	0	0	0
	Total workload	127.5	127.5	0	0	0	0
Credit points	3						
Requirements for taking the course	☐ None ☒ Prerequisite course: Reaction Kinetics and Catalysis (CHE2011IU) ☐ Parallel course: <i>(Please specify course ID & course title, if any)</i> ☐ Previous course: <i>(Please specify course ID & course title, if any)</i>						
Course objectives	Upon successful completion of this course, the students should demonstrate knowledge of: • The principles of green chemistry • Understand the different green resources • Understand green catalysis processes and green organic solvents • Design a green process Potential and commercial industrial green processes.						
Course learning outcomes	Upon the successful completion of this course, students will be able to:						
	Competency level¹	Course learning outcome (CLO)					
	Knowledge	CLO1. Be able to develop a working knowledge of the twelve fundamental principles of green chemistry [Evaluating]. CLO2. Be able to apply the novel green reactors concepts [Creating].					

¹ Level of competence according to Bloom's Taxonomy:

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x
Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination
Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x

	<table><tr><td>Skill</td><td>CLO3. Acquire and apply new knowledge as needed, using appropriate learning strategies [Complex Overt Response].</td></tr><tr><td>Attitude</td><td>CLO4. Be able to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts [Internalizing values].</td></tr></table>	Skill	CLO3. Acquire and apply new knowledge as needed, using appropriate learning strategies [Complex Overt Response].	Attitude	CLO4. Be able to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts [Internalizing values].																																																				
Skill	CLO3. Acquire and apply new knowledge as needed, using appropriate learning strategies [Complex Overt Response].																																																								
Attitude	CLO4. Be able to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts [Internalizing values].																																																								
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> <u>Weight</u>: lecture session (2.5 hours) <u>Teaching levels</u>: I (Introduce); T (Teach); U (Utilize) <table><tr><th>No.</th><th>Topic</th><th>Weight</th><th>Level</th></tr><tr><td>1</td><td>Principles and Concepts of Green Chemistry</td><td>1</td><td>I, T</td></tr><tr><td>2</td><td>Waste: Production, Problems and Prevention</td><td>1</td><td>I, T</td></tr><tr><td>3</td><td>Measuring and Controlling Environmental Performance</td><td>1</td><td>I, T</td></tr><tr><td>4</td><td>Catalysis and Green Chemistry</td><td>1</td><td>I, T</td></tr><tr><td>5</td><td>Organic Solvents: Environmentally Benign Solutions</td><td>1</td><td>I, T</td></tr><tr><td>6</td><td>Renewable Resources</td><td>1</td><td>I, T</td></tr><tr><td>7</td><td>Emerging Greener Technologies and Alternative Energy Sources</td><td>1</td><td>I, T</td></tr><tr><td>8</td><td>Designing Greener Processes</td><td>1</td><td>I, T</td></tr><tr><td>9</td><td>Industrial Case Studies</td><td>1</td><td>I, T</td></tr><tr><td>10</td><td>Application of Green Catalysis and Processes</td><td>1</td><td>I, T</td></tr><tr><td>11</td><td>CO₂ conversion</td><td>1</td><td>I, T</td></tr><tr><td>12</td><td>Lignin conversion</td><td>1</td><td>I, T</td></tr><tr><td>13</td><td>The Future’s Green: An Integrated Approach to a Greener Chemical Industry</td><td>1</td><td>I, T</td></tr></table>	No.	Topic	Weight	Level	1	Principles and Concepts of Green Chemistry	1	I, T	2	Waste: Production, Problems and Prevention	1	I, T	3	Measuring and Controlling Environmental Performance	1	I, T	4	Catalysis and Green Chemistry	1	I, T	5	Organic Solvents: Environmentally Benign Solutions	1	I, T	6	Renewable Resources	1	I, T	7	Emerging Greener Technologies and Alternative Energy Sources	1	I, T	8	Designing Greener Processes	1	I, T	9	Industrial Case Studies	1	I, T	10	Application of Green Catalysis and Processes	1	I, T	11	CO ₂ conversion	1	I, T	12	Lignin conversion	1	I, T	13	The Future’s Green: An Integrated Approach to a Greener Chemical Industry	1	I, T
No.	Topic	Weight	Level																																																						
1	Principles and Concepts of Green Chemistry	1	I, T																																																						
2	Waste: Production, Problems and Prevention	1	I, T																																																						
3	Measuring and Controlling Environmental Performance	1	I, T																																																						
4	Catalysis and Green Chemistry	1	I, T																																																						
5	Organic Solvents: Environmentally Benign Solutions	1	I, T																																																						
6	Renewable Resources	1	I, T																																																						
7	Emerging Greener Technologies and Alternative Energy Sources	1	I, T																																																						
8	Designing Greener Processes	1	I, T																																																						
9	Industrial Case Studies	1	I, T																																																						
10	Application of Green Catalysis and Processes	1	I, T																																																						
11	CO ₂ conversion	1	I, T																																																						
12	Lignin conversion	1	I, T																																																						
13	The Future’s Green: An Integrated Approach to a Greener Chemical Industry	1	I, T																																																						
Examination forms	☒ Multiple-choice questions ☐ Oral examination																																																								

	☐ Report ☒ Written examination ☐ Presentation ☐ Others, please specify: ☐ Assignments
Other requirements	<u>Attendance:</u> 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. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.
Reading list	I. Textbooks [1] Mike Lancaster, <i>Green Chemistry – An Introduction text</i>, RSC, 2002. [2] Mukesh Doble, Anil Kumar Kruthiventi, <i>Green Chemistry & Engineering</i>, Elsevier, 2007. [3] S. Suresh and S. Sundaramoorthy, <i>Green Chemical Engineering – An introduction to Catalysis, Kinetics, and Chemical Processes</i>, CRC Press, 2015 [4] Buxing Han, Tianbin (Eds.), <i>Green Chemistry and Chemical Engineering</i>, in “Encyclopedia of Sustainability Science and Technology Series”, 2nd Edition, Springer, 2013 II. References

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	5						
	2		6					
	3							
Skills (Level: 1-7)	4							
	5							
	6						5	
Attitudes (Level: 1-5)	7							5
	8							
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	5.0	6.0	0.0	0.0	0.0	5.0	5.0
L,M,H conversion*		H	H				H	H

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Principles and Concepts of Green Chemistry	1,2		- Lecture - Class discussion	[1]. [2].
2.	2	Waste: Production, Problems and Prevention	1,2,4	Homework	- Lecture - Class discussion	[1].
3.	3	Measuring and Controlling Environmental Performance	1,2,4	Homework	- Lecture - Class discussion	[1].
4.	4	Catalysis and Green Chemistry	1,2	Homework	- Lecture - Class discussion	[1].
5.	5	Organic Solvents: Environmentally Benign Solutions	1,2	Homework	- Lecture - Class discussion	[1].
6.	6	Renewable Resources	1,2,3	Quiz	- Lecture - Class discussion	[1].

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
7.	7	Emerging Greener Technologies and Alternative Energy Sources	1,2	Homework	- Lecture - Class discussion	[1].
8.	8	Designing Greener Processes	1,2	Homework	- Lecture - Class discussion	[1]. [2].
9.	9	Midterm				
10.	10	Industrial Case Studies	1,2,3	Homework	- Lecture - Class discussion	[1]. [2].
11.	11	Application of Green Catalysis and Processes	1,2	Homework	- Lecture - Class discussion	[3].
12.	12	CO ₂ conversion	1,2	Homework	- Lecture - Class discussion	[4].
13.	13	Lignin conversion	1,2	Quiz	- Lecture - Class discussion	[4].
14.	14	The Future's Green: An Integrated Approach to a Greener Chemical Industry	1,2,3	Homework	- Lecture - Class discussion	[1]. [2].
15.	15, 16	Group presentation	1,2, 3,4		Oral presentation	
16.	17	Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
In-class exercises/quizzes/ Homework (10%)	HW, Quiz 60%Pass	HW, Quiz 60%Pass		HW, Quiz 60%Pass

Assessment Type	CLO1	CLO2	CLO3	CLO4
Group presentation (20%)	Group presentation 50%Pass	Group presentation 50%Pass	Group presentation 50%Pass	
Midterm exam (30%)		Q3 50%Pass	Q1, Q2 50%Pass	
Final exam (40%)	Part I 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): No

6. Revision Date: May 20, 2023

Ho Chi Minh City, 20/5/2023

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	An ability to identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	An ability to communicate (in English) effectively with a range of audiences
4	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Nanomaterials

(Vật liệu nano)

Course Code: CH011IU

1. General information

Course designation	This course will discuss the synthesis, properties characterization and applications of materials structured on the nanometer scale.																																									
Teaching schedule	☐ Year 1 ☐ Year 2 ☐ Year 3 ☒ Year 4 ☐ Year 5 ☒ Semester 1 ☐ Semester 2 ☐ Summer																																									
Person In-Charge	Dr. Vu Bao Khanh, vbkhanh@hcmiu.edu.vn																																									
Language	English																																									
Relation to curriculum	☐ General ☐ Fundamental ☒ Specialization ☐ Project/Internship/Thesis				☐ Compulsory ☒ Elective																																					
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify:																																									
Workload	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th><th></th><th>Lecture</th><th>Lab</th><th>Project</th><th>Internship</th><th>Thesis</th></tr> </thead> <tbody> <tr> <td></td><td><i>Credit</i></td><td>3</td><td></td><td></td><td></td><td></td></tr> <tr> <td>Contact hours</td><td>37.5</td><td>37.5</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td>Self-Study hours</td><td>90</td><td>90</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td>Total workload</td><td>127.5</td><td>127.5</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> </tbody> </table>									Lecture	Lab	Project	Internship	Thesis		<i>Credit</i>	3					Contact hours	37.5	37.5	0	0	0	0	Self-Study hours	90	90	0	0	0	0	Total workload	127.5	127.5	0	0	0	0
		Lecture	Lab	Project	Internship	Thesis																																				
	<i>Credit</i>	3																																								
Contact hours	37.5	37.5	0	0	0	0																																				
Self-Study hours	90	90	0	0	0	0																																				
Total workload	127.5	127.5	0	0	0	0																																				
Credit points	3																																									

Requirements for taking the course	☐ None ☐ Prerequisite course: <i>(Please specify course ID & course title, if any)</i> ☐ Parallel course: <i>(Please specify course ID & course title, if any)</i> ☒ Previous course: Analytical chemistry 2 (CHE1061IU); Inorganic Chemistry (CHE2103IU); Physical Chemistry 2 (CHE1043IU)																																						
Course objectives	The course will discuss fabrication methods for nanomaterials, including physical and chemical methods. The optical, electronic, and catalytic properties of nanomaterials will be presented. The section dealing with the applications of nanomaterials is interactive: each group of students will be assigned a specific type or application of nanomaterials, which will be studied and presented to the class in a short lecture.																																						
Course learning outcomes	Upon the successful completion of this course, students will be able to: <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 15%;">Competency level¹</th> <th style="width: 85%;">Course learning outcome (CLO)</th> </tr> </thead> <tbody> <tr> <td>Knowledge</td> <td> CLO1. Describe the fundamental principles of nanomaterials, including size-dependent properties, quantum confinement. [Remember] CLO2. Apply analytical and characterization tools to study the structure and properties of nanomaterials. [Apply] CLO3. Analyze the physical, chemical, and biological properties of nanomaterials for use in various applications. [Analyze] </td> </tr> <tr> <td>Skill</td> <td> CLO4. Differentiate the diverse synthesis methods used to produce nanomaterials. [Perception] CLO5. Participate in a group research project and present the results of this project in a professional manner. [Adaptation] </td> </tr> <tr> <td>Attitude</td> <td></td> </tr> </tbody> </table>							Competency level ¹	Course learning outcome (CLO)	Knowledge	CLO1. Describe the fundamental principles of nanomaterials, including size-dependent properties, quantum confinement. [Remember] CLO2. Apply analytical and characterization tools to study the structure and properties of nanomaterials. [Apply] CLO3. Analyze the physical, chemical, and biological properties of nanomaterials for use in various applications. [Analyze]	Skill	CLO4. Differentiate the diverse synthesis methods used to produce nanomaterials. [Perception] CLO5. Participate in a group research project and present the results of this project in a professional manner. [Adaptation]	Attitude																									
Competency level ¹	Course learning outcome (CLO)																																						
Knowledge	CLO1. Describe the fundamental principles of nanomaterials, including size-dependent properties, quantum confinement. [Remember] CLO2. Apply analytical and characterization tools to study the structure and properties of nanomaterials. [Apply] CLO3. Analyze the physical, chemical, and biological properties of nanomaterials for use in various applications. [Analyze]																																						
Skill	CLO4. Differentiate the diverse synthesis methods used to produce nanomaterials. [Perception] CLO5. Participate in a group research project and present the results of this project in a professional manner. [Adaptation]																																						
Attitude																																							
¹ Level of competence according to Bloom's Taxonomy: <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th></th> <th>Level 1</th> <th>Level 2</th> <th>Level 3</th> <th>Level 4</th> <th>Level 5</th> <th>Level 6</th> <th>Level 7</th> </tr> </thead> <tbody> <tr> <td>Knowledge</td> <td>Remembering</td> <td>Understanding</td> <td>Applying</td> <td>Analyzing</td> <td>Evaluating</td> <td>Creating</td> <td style="background-color: #cccccc;">x</td> </tr> <tr> <td>Skills</td> <td>Perception</td> <td>Set</td> <td>Guided Response</td> <td>Mechanism</td> <td>Complex Overt Response</td> <td>Adaptation</td> <td>Origination</td> </tr> <tr> <td>Attitudes</td> <td>Receiving Phenomena</td> <td>Responding to Phenomena</td> <td>Valuing</td> <td>Organization</td> <td>Internalizing values</td> <td style="background-color: #cccccc;">x</td> <td style="background-color: #cccccc;">x</td> </tr> </tbody> </table>									Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7	Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x	Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination	Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x
	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7																																
Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x																																
Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination																																
Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x																																

Content	<u>Weight</u> : lecture session (2.5 hours) <u>Teaching levels</u> : I (Introduce); T (Teach); U (Utilize)			
	No.	Topic	Weight	Level
	1	Introduction to Nanomaterials	1	I, T
	2	Crystal Structure of Nanomaterials	2	T, U
	3	Length Scales of Nanomaterials	1	T, U
	4	Types of Nanostructures (0D, 1D, 2D)	2	T
	5	Synthesis of Nanomaterials	2	T, U
	6	Characterization of Nanomaterials	2	T
	7	Applications of nanomaterials	1	T, U
	8	Special Topics presented by Students	1	T, U
	9	Porous Nanomaterials: Structure and Synthesis	0.5	I, T
	10	Recent developments in nanomaterials	0.5	I, T
Examination forms	☐ Multiple-choice questions ☐ Oral examination ☐ Report ☒ Written examination ☒ Presentation ☐ Others, please specify: ☐ Assignments			
Other requirements	<u>Attendance</u> : 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. <u>Assignments/Examination</u> : Students must have more than 50/100 points overall to pass this course.			
Reading list	I. Textbooks [1] A.S.Edelstein and R.C.Cammarata Ed. Nanomaterials: Synthesis, Properties and Applications, Institute of Physics Publishing, Bristol and Philadelphia, 1996 [2] Guozhong Cao, Nanostructures & nanomaterials, Imperial College Press, London, 2004 [3] Gregory Timp Ed., Nanotechnology, AIP Press, Springer, 1998 [4] J. H. Fendler Ed., Nanoparticles and Nanostructured Films, Wiley-VCH, 1998 [5] C. P. Poole, Jr. and F. J. Owens, Introduction of Nanotechnology, Wiley, 2003 II. References			

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-5) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	1						
	2	3						
	3	4						
Skills (Level: 1-7)	4						1	
	5				6			
Attitudes (Level: 1-5)								
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	2.7	0.0	0.0	6.0	0.0	1.0	0.0
L,M,H conversion*		L			H		L	

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Introduction to Nanomaterials	1	HW	Lecture	
2.	2&3	Crystal Structure of Nanomaterials	1,2,3	HW	Lecture	
3.	4&5	Length Scales of Nanomaterials	1	HW	Lecture	
4.	6	Types of Nanostructures (0D, 1D, 2D)	1,2,3	HW	Lecture	
5.	7&8	Synthesis of Nanomaterials	4	HW	Lecture	
6.	9-10	Midterm				
7.	11&12	Characterization of Nanomaterials	2	HW	Lecture	
8.	13&14	Porous Nanomaterials: Structure and Synthesis	2,3	HW	Lecture	
9.	15	Special Topics Presented by Students	5	HW	Teamwork presentation	
10.	16	Special Topics Presented by Students	5	HW	Teamwork presentation	
11.	17	Special Topics Presented by Students	5	HW	Teamwork presentation	
12.	18	Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4	CLO5
Homework/Presentation (30%)					>50%pass
Midterm exam (30%)	>50%pass				
Final exam (40%)		>50%pass	>50%pass	>50%pass	

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

5. Rubrics (optional): No

6. Revision Date: May 20, 2023

Ho Chi Minh City, 20/5/2023

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



**VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY**
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Biomaterials
(Vật liệu sinh học)
Course Code: CHE3221IU

1. General information

Course designation	An engineer of chemical engineering major should understand biomaterials, and its surface modification for specific applications. Also, an engineer must understand how to choose materials and how to design a scaffold for specific implantation zone.		
Teaching schedule	☐ Year 1 ☐ Year 2 ☐ Year 3 ☒ Year 4 ☐ Year 5		
	☒ Semester 1 ☐ Semester 2 ☐ Summer		
Person In-Charge			
Language	English		
Relation to curriculum	☐ General ☐ Fundamental ☒ Specialization ☐ Project/Internship/Thesis	☐ Compulsory ☒ Elective	
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify:		

Workload			Lecture	Lab	Project	Internship	Thesis
		<i>Credit</i>	3				
	Contact hours	37.5	37.5	0	0	0	0
	Self-Study hours	90	90	0	0	0	0
	Total workload	127.5	127.5	0	0	0	0
Credit points	3						
Requirements for taking the course	☒ None ☐ Prerequisite course: ☐ Parallel course: ☐ Previous course:						
Course objectives	To explain basic principles of biocompatibility and implants performance, review different strategies to modify and/or design materials that are biocompatible. Also, this course will explain what biodegradability is and how it affects biomaterial design. These allow students to understand material selection and structure-function relationships and read, understand and assimilate papers, publications and lectures in the biomaterials. Student will obtain enough knowledge to develop analysis and critical-thinking skills for the evaluation of relevant literature.						
Course learning outcomes	Upon the successful completion of this course, students will be able to:						
	Competency level¹	Course learning outcome (CLO)					
	Knowledge	CLO1. Give the definition of a biomaterial. [Understanding] CLO2. Describe the structure and composition of naturally occurring biomaterials, such as tooth enamel, bone, collagen, skin etc. [Remembering] CLO3. Describe methods of manufacture of the different types of materials used in medicine and biosciences, their properties and their suitability for a particular function. [Remembering] CLO4. Describe methods of modifying surfaces and their impact on the material/biological interface. [Remembering] CLO5. Describe physical techniques used in biomaterials research, such as x-ray photoelectron spectroscopy, electron microscopy, scanning probe microscopy, force microscopy and quartz crystal resonance and apply these to qualitatively					

		and quantitatively derive information about how materials interact with biological systems. [Remembering]
	Skill	CLO6. Derive mathematical expressions relating to material stress, strain and viscoelastic properties and describe and quantify failure mechanisms. [Guided response]
	Attitude	CLO7. Participate in a group research project and present the results of this project in a professional manner. [Responding to phenomena]

Level of competence according to Bloom's Taxonomy:

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x
Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination
Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x

Content

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

Weight: lecture session (2.5 hours)

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

No.	Topic	Weight	Level
1	Course introduction	1	I, T
2	Polymers: Polymer synthesis, Polymer characterization	2	T, U
3	Biodegradable polymers: chemistry of hydrolysis, degradation mechanisms	1	T, U
4	Hydrogels: hydrogel structure and crosslinking, hydrogel swelling and characterization	2	T
5	Hydrogels: Polyelectrolyte swelling and applications	2	T, U
6	Adhesives and coatings: Natural polymers and adhesion; Surface treatments and analysis	2	T

	7	Biomaterial analysis: Thermal & Advanced mechanical analysis	1	T, U
	8	Biologic Recognition: Protein adsorption; Engineered recognition	1	T, U
	9	Biologic Response: Thrombosis/Blood compatibility; Tissue compatibility and testing	0.5	I, T
Examination forms	☐ Multiple-choice questions ☐ Oral examination ☐ Report ☒ Written examination ☒ Presentation ☐ Others, please specify: ☐ Assignments			
Other requirements	<u>Attendance:</u> 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. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.			
Reading list	I. Textbooks 1. Encyclopedia of Biomaterials and Biomedical Engineering. Editors, Gary E. Wnek, Gary L. Bowlin. Informa Healthcare Publishing, 2008 2. Biomaterials Science: An Introduction to Materials in Medicine, eds. Ratner, B.D. et al. 2nd Ed. 2004. 3. Biomaterials: An Introduction, Park JB. 2007, 3rd Edition. (full text available online) 4. Materials Science and Engineering: An Introduction, Callister, W.D.Jr. 2002. 6th Ed. 5. Principles of Polymer Chemistry, Flory, Paul J., 1953. 6. Tissue engineering. Editors, Bernhard O. Palson, Sangeeta N. Bhatia. Prentice Hall Publishing. 2004 II. References			

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-6) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	2						
	2	1						
	3	1						
	4	1						
	5	1						
Skills (Level: 1-7)	6						3	
Attitudes (Level: 1-5)	7							2
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	1.2	0.0	0.0	0.0	0.0	3.0	2.0
L,M,H conversion*		L					M	L

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Course introduction	1,2	HW	Lecture	
2.	2&3	Polymers: Polymer synthesis, Polymer characterization	3	HW	Lecture	
3.	4&5	Biodegradable polymers: chemistry of hydrolysis, degradation mechanisms	3	HW	Lecture	
4.	6	Hydrogels: hydrogel structure and crosslinking, hydrogel swelling and characterization	3	HW	Lecture	
5.	7	Hydrogels: Polyelectrolyte swelling and applications	3	HW	Lecture	
6.	8	Adhesives and coatings: Natural polymers and adhesion; Surface	3,4	HW	Lecture	

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
		treatments and analysis				
7.	9-10	Midterm exam				
8.	11	Biomaterial analysis: Thermal & Advanced mechanical analysis	5			
9.	12	Biologic Recognition: Protein adsorption; Engineered recognition	4	HW	Lecture	
10.	13	Biologic Response: Thrombosis/Blood compatibility; Tissue compatibility and testing	3	HW	Lecture	
11.	14	Controlled Release: Membrane systems; Swellable systems	3	HW	Lecture	
12.	15	Micro and nanoparticle systems: Overview; Stealth systems	3	HW	Lecture	
13.	16	Special Topics Presented by Students	7		Presentation	
14.	17	Special Topics Presented by Students	7		Presentation	
15.	18	Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4	CLO5	CLO6	CLO7
HW/Presentation (30%)		>50%pass		>50%pass			
Midterm exam (30%)		>50%pass	>50%pass				
Final exam (40%)				>50%pass	>50%pass		

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

5. Rubrics (optional): No

6. Revision Date: May 20, 2023

	<i>Ho Chi Minh City, 20/5/2023</i> Dean of School of Chemical and Environmental Engineering  Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No .	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



**VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY**
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Organic Chemistry Synthesis

(Tổng hợp Hữu cơ)

Course Code: CHE3331IU

1. General information

Course designation	This course provides the students with intermediate level of organic chemistry with an emphasis on organic synthesis. Organic synthesis is the process of building organic molecules from simpler starting materials through chemical reactions. This is an important subject since organic molecules form the basic fabric of life.		
Teaching schedule	☐ Year 1 ☐ Year 2 ☐ Year 3 ☒ Year 4 ☐ Year 5 ☒ Semester 1 ☐ Semester 2 ☐ Summer		
Person In-Charge	Dr. Le Quang Phong, lqphong@hcmiu.edu.vn Template: (Name in Vietnamese order), (Email)		
Language	English		
Relation to curriculum	☐ General ☐ Fundamental ☒ Specialization ☐ Project/Internship/Thesis	☐ Compulsory ☒ Elective	
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify:		

Workload			Lecture	Lab	Project	Internship	Thesis
		Credit	3				
	Contact hours	37.5	37.5	0	0	0	0
	Self-Study hours	90	90	0	0	0	0
	Total workload	127.5	127.5	0	0	0	0
Credit points	3						
Requirements for taking the course	☐ None ☐ Prerequisite course: (Please specify course ID & course title, if any) ☐ Parallel course: ☒ Previous course: Organic Chemistry 2 CHE1091IU						
Course objectives	The students will gain understanding in fundamental reactions, mechanisms, and strategies of organic synthesis; will become proficient at reading organic chemistry literature and learn how to search for this information using modern information resources.						
Course learning outcomes	Upon the successful completion of this course, students will be able to:						
	Competency level	Course learning outcome (CLO)					
	Knowledge	CLO1. Demonstrate knowledge and understand concepts, principles and theories relating to organic synthesis. [2] CLO2. Apply such knowledge and understanding to the solution of problems related to the synthesis of organic target molecules [3]					
	Skill	CLO3. Develop new route to synthesis of organic compounds [4]					
	Attitude	CLO4. Demonstrate reasoned solutions to organic synthesis problems which reflect ethical standards and responsibilities.[3]					
Content	The description of the contents should clearly indicate the weighting of the content and the level. <u>Weight</u> : lecture session (2.5 hours) <u>Teaching levels</u> : I (Introduce); T (Teach); U (Utilize)						
	No.	Topic	Weight			Level	
	1	Synthesis design and stereochemical considerations in planning syntheses	1			I, T	
	2	The concept of protecting some functional groups N-H, O-H, diols	1			I, T	
	3	Protecting functional groups: aldehydes, ketones, carboxylic acids	2			I, T	
	4	Functional group transformation: oxidation and reduction	2			U, T	
	5	Enolate chemistry 1,3-dicarbonyl enolates; ester and ketone enolates	1			U, T	
	6	Imines, hydrazones and enamines	1			U, T	

	7	Aldol reactions	2	U, T
	8	Mannich reaction, Michael addition, Robinson Annulation	1	U, T
	9	Formation of carbon-carbon π -bonds	2	I, T
	10	Wittig and related olefination reactions	1	I, T
	11	Synthesis of carbocyclic systems: cation- π cyclizations, Diels-Alder reaction	1	U, T
Examination forms	☒ Multiple-choice questions ☐ Oral examination ☐ Report ☒ Written examination ☐ Presentation ☐ Others, please specify: ☒ Assignments			
Other requirements	<u>Attendance:</u> 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. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.			
Reading list	I. Textbooks [1] G. S. Zweifel and M. H. Nantz, Modern Organic Synthesis, An Introduction. 2007, W. H. Freeman. [2] E. J. Corey and Xue-min Chelg, The Logic of Chemical Synthesis. 1995, John Wiley & Sons II. References			

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	2						
	2	3						
Skills (Level: 1-7)	3						4	
Attitudes (Level: 1-5)	4							3
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	2,5	0,0	0,0	0,0	0,0	4,0	3,0
L,M,H conversion*		L					H	M

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Synthesis design and stereochemical considerations in planning syntheses	1		- Lecture - Class discussion	
2.	2	The concept of protecting some functional groups N-H, O-H, diols	1		- Lecture - Class discussion	
3.	3, 4	Protecting functional groups: aldehydes, ketones, carboxylic acids	1,2	Assignment	- Lecture - Class discussion	
4.	5, 6	Functional group transformation: oxidation and reduction	1,2	Assignment	- Lecture - Class discussion	
5.	7	Enolate chemistry 1,3-dicarbonyl enolates; ester and ketone enolates	1,2	Quiz, Assignment	- Lecture - Class discussion	
6.	8	Imines, hydrazones and enamines	1,2	Quiz	- Lecture - Class discussion	
7.	9-10	Midterm				
8.	11, 12	The aldol reactions	1,2	Assignment	- Lecture - Class discussion	
9.	13	Mannich reaction, Michael addition, Robinson Annulation	1,2,3	Assignment	- Lecture - Class discussion	
10.	14, 15	Formation of carbon-carbon π -bonds	2,3		- Lecture - Class discussion	
11.	16	Wittig and related olefination reactions	1,2	Assignment	- Lecture - Class discussion	
12.	17	Synthesis of carbocyclic systems: cation- π cyclizations, Diels-Alder reaction	2,3,4		- Lecture - Class discussion	
13.		Final Exam				

Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
Assignment, Quiz (30%)	Quiz Assignment 50%Pass	Quiz Assignment 50%Pass	Quiz, Assignment 50 %Pass	Quiz, Assignment 50 %Pass
Midterm exam (30%)	50%Pass	50%Pass		
Final exam (40%)	50 % Pass	50 % Pass	50 % Pass	50 % Pass

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

4. Rubrics (optional): No

5. Revision Date: May 20, 2023

Ho Chi Minh City, 20/5/2023

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: ADVANCED ENGINEERING DRAWING

(Vẽ kỹ thuật Nâng cao)

Course Code: CHE3414IU

1. General information

Course designation	This course is one of the main skills training courses of the chemical engineering curriculum as it conveys the advanced knowledge of AutoCAD that chemical engineers must achieve. It requires the essential knowledge from the course “Engineering Drawing” about objects, projections and the basics of AutoCAD.																																								
Teaching schedule	☐ Year 1 ☐ Year 2 ☐ Year 3 ☒ Year 4 ☐ Year 5 ☒ Semester 1 ☐ Semester 2 ☐ Summer																																								
Person In-Charge	Dr. Pham Thanh Tung, pttung@hcmiu.edu.vn																																								
Language	English																																								
Relation to curriculum	☐ General ☐ Fundamental ☒ Specialization ☐ Project/Internship/Thesis			☐ Compulsory ☒ Elective																																					
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify: Assignments, practice, discussion																																								
Workload	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th></th><th></th><th>Lecture</th><th>Lab</th><th>Project</th><th>Internship</th><th>Thesis</th></tr> </thead> <tbody> <tr> <td></td><td><i>Credit</i></td><td>2</td><td>0</td><td></td><td></td><td></td></tr> <tr> <td>Contact hours</td><td>25</td><td>25</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td>Self-Study hours</td><td>60</td><td>60</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td>Total workload</td><td>85</td><td>85</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> </tbody> </table>								Lecture	Lab	Project	Internship	Thesis		<i>Credit</i>	2	0				Contact hours	25	25	0	0	0	0	Self-Study hours	60	60	0	0	0	0	Total workload	85	85	0	0	0	0
		Lecture	Lab	Project	Internship	Thesis																																			
	<i>Credit</i>	2	0																																						
Contact hours	25	25	0	0	0	0																																			
Self-Study hours	60	60	0	0	0	0																																			
Total workload	85	85	0	0	0	0																																			
Credit points	2																																								

Requirements for taking the course	☐ None ☐ Prerequisite course: <i>(Please specify course ID & course title, if any)</i> ☒ Parallel course: <i>Advanced Engineering Drawing Lab (CHE3415IU)</i> ☐ Previous course: <i>(Please specify course ID & course title, if any)</i>																						
Course objectives	The aim of this course is to - Provide the ability of effectively construct and manage the engineering drawing complied with TCVN and ISO by using AutoCAD software. - Provide advanced knowledge for using and geometrical construction with the drawing instruments and AutoCAD software, the standard of presentation of engineering drawing.																						
Course learning outcomes	Upon the successful completion of this course, students will be able to: <table><tr><th>Competency level¹</th><th colspan="2">Course learning outcome (CLO)</th></tr><tr><td>Knowledge</td><td colspan="2">CLO1. Understand the criteria for engineering drawings and how to use AutoCAD to meet the conventional criteria [Applying].</td></tr><tr><td>Skill</td><td colspan="2">CLO2. Use AutoCAD interface and drafting tools, mastering Autocad function and commands at high levels [Complex Overt Response]</td></tr><tr><td>Attitude</td><td colspan="2">CLO3. Work independently and professionally [Valuing]</td></tr></table>			Competency level ¹	Course learning outcome (CLO)		Knowledge	CLO1. Understand the criteria for engineering drawings and how to use AutoCAD to meet the conventional criteria [Applying].		Skill	CLO2. Use AutoCAD interface and drafting tools, mastering Autocad function and commands at high levels [Complex Overt Response]		Attitude	CLO3. Work independently and professionally [Valuing]									
Competency level ¹	Course learning outcome (CLO)																						
Knowledge	CLO1. Understand the criteria for engineering drawings and how to use AutoCAD to meet the conventional criteria [Applying].																						
Skill	CLO2. Use AutoCAD interface and drafting tools, mastering Autocad function and commands at high levels [Complex Overt Response]																						
Attitude	CLO3. Work independently and professionally [Valuing]																						
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> <u>Weight</u>: lecture session (2.5 hours) <u>Teaching levels</u>: I (Introduce); T (Teach); U (Utilize) <table><tr><th>No.</th><th>Topic</th><th>Weight</th><th>Level</th></tr><tr><td>1</td><td>Technical Drawing Overview</td><td>1</td><td>I, T</td></tr><tr><td>2</td><td>Setting up and using the Drafting tools</td><td>1</td><td>T, U</td></tr><tr><td>3</td><td>Organizing Objects with Blocks and Groups</td><td>1</td><td>T, U</td></tr><tr><td>4</td><td>Editing and Reusing Data to Work Efficiently</td><td>1</td><td>T, U</td></tr></table>			No.	Topic	Weight	Level	1	Technical Drawing Overview	1	I, T	2	Setting up and using the Drafting tools	1	T, U	3	Organizing Objects with Blocks and Groups	1	T, U	4	Editing and Reusing Data to Work Efficiently	1	T, U
No.	Topic	Weight	Level																				
1	Technical Drawing Overview	1	I, T																				
2	Setting up and using the Drafting tools	1	T, U																				
3	Organizing Objects with Blocks and Groups	1	T, U																				
4	Editing and Reusing Data to Work Efficiently	1	T, U																				

¹ Level of competence according to Bloom's Taxonomy:

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x
Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination
Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x

	5	Introduce to Printing, Plotting and Layouts	1	I, T
	6	Using Field and Table	1	T, U
	7	Advanced Editing and Organising	1	T, U
	8	Laying Out your Printer Output	1	T, U
	9	Using Dynamic Blocks	1	T, U
	10	Getting and Exchanging Data from Drawings	1	I, U
Examination forms	☐ Multiple-choice questions ☐ Oral examination ☐ Report ☐ Written examination ☐ Presentation ☒ Others, please specify: Constructed-response test ☐ Assignments			
Other requirements	<u>Attendance:</u> 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. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.			
Reading list	I. Textbooks [1] George Omura, Brian C. Benton (2015), Mastering AutoCAD 2016 and AutoCAD LT 2016: Autodesk Official Press 1st Edition, Sybex Publisher 2015. II. References [2] Trần Hữu Quế – Nguyễn Văn Tuấn (2009), Vẽ kỹ thuật theo tiêu chuẩn quốc tế, NXB Bách Khoa Hà Nội.			

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-3) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	3						
	2							
	3							
Skills (Level: 1-7)	4							
	5					5		
	6							
Attitudes (Level: 1-5)	7							3
	8							
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	3.0	0.0	0.0	0.0	5.0	0.0	3.0
L,M,H conversion*		M				H		M

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Technical Drawing Overview	1,3	Attendance Q&A Homework 1	Reading materials before class; Doing the lecture; Demo on the computer; Practicing.	[1] 1 [2] 1,2,3
2.	2	Setting up and using the Drafting tools	1,2,3	Attendance Q&A Homework 2	Reading materials before class; Doing the lecture; Demo on the computer; Practicing.	[1] 2
3.	3	Organizing Objects with Blocks and Groups	2,3	Attendance Q&A Homework 3	Reading materials before class; Doing the lecture; Demo on the computer; Practicing.	[1] 3
4.	4	Editing and Reusing Data to Work Efficiently	2,3	Attendance Q&A Homework 4	Reading materials before class; Doing the lecture; Demo on the computer; Practicing.	[1] 4
5.	5	Introduce to Printing, Plotting and Layouts	2,3	Attendance Q&A Homework 5	Reading materials before class; Doing the lecture; Demo on the computer; Practicing.	[1] 5
6.	6	Using Field and Table	2,3	Attendance Q&A Homework 6	Reading materials before class; Doing the lecture; Demo on the computer; Practicing.	[1] 6
7.	7	Advanced Editing and Organising	2,3	Attendance Q&A Homework 7	Reading materials before class; Doing the lecture; Demo on the computer; Practicing.	[1] 7
8.	8	Laying Out your Printer Output	2,3	Attendance Q&A Homework 8	Reading materials before class; Doing the lecture; Demo on the computer; Practicing.	[1] 8
9.	9-10	Midterm examination		Practice on computer		
10.	11	Using Dynamic Blocks	2,3	Attendance Q&A Homework 9	Reading materials before class; Doing the lecture; Demo on the computer; Practicing.	[1] 9
11.	12	Getting and Exchanging Data from Drawings	2,3	Attendance Q&A Homework 10	Reading materials before class; Doing the lecture; Demo on the computer; Practicing.	[1] 10
12.	18-19	Final examination		Practice on computer		

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3
Class attendance (15%)			Attended 80%Pass
Homeworks (15%)			HW1-10, Submitted 80%Pass
Midterm exam (Mid, 30%)	60%Pass	60%Pass	
Final exam (Fin, 40%)	60%Pass	60%Pass	

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

5. Rubrics (optional): No

6. Revision Date: May 20, 2023

Ho Chi Minh City, 20/5/2023

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	An ability to identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	An ability to communicate (in English) effectively with a range of audiences
4	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: ADVANCED ENGINEERING DRAWING LAB

(Thực Hành Vẽ kỹ thuật Nâng cao)

Course Code: CHE3415IU

1. General information

Course designation	This course is one of the main skills training courses of the chemical engineering curriculum as it conveys the advanced knowledge of AutoCAD that chemical engineers must achieve. It requires the essential knowledge from the course “Engineering Drawing” about objects, projections and the basics of AutoCAD.																																								
Teaching schedule	☐ Year 1 ☐ Year 2 ☐ Year 3 ☒ Year 4 ☐ Year 5 ☒ Semester 1 ☐ Semester 2 ☐ Summer																																								
Person In-Charge	Dr. Pham Thanh Tung, pttung@hcmiu.edu.vn																																								
Language	English																																								
Relation to curriculum	☐ General ☐ Fundamental ☒ Specialization ☐ Project/Internship/Thesis			☐ Compulsory ☒ Elective																																					
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify: Assignments, practice, discussion																																								
Workload	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th><th></th><th>Lecture</th><th>Lab</th><th>Project</th><th>Internship</th><th>Thesis</th></tr> </thead> <tbody> <tr> <td></td><td><i>Credit</i></td><td>0</td><td>1</td><td></td><td></td><td></td></tr> <tr> <td>Contact hours</td><td>25</td><td>0</td><td>25</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td>Self-Study hours</td><td>30</td><td>0</td><td>30</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td>Total workload</td><td>55</td><td>0</td><td>55</td><td>0</td><td>0</td><td>0</td></tr> </tbody> </table>								Lecture	Lab	Project	Internship	Thesis		<i>Credit</i>	0	1				Contact hours	25	0	25	0	0	0	Self-Study hours	30	0	30	0	0	0	Total workload	55	0	55	0	0	0
		Lecture	Lab	Project	Internship	Thesis																																			
	<i>Credit</i>	0	1																																						
Contact hours	25	0	25	0	0	0																																			
Self-Study hours	30	0	30	0	0	0																																			
Total workload	55	0	55	0	0	0																																			

Credit points	1								
Requirements for taking the course	☐ None ☐ Prerequisite course: <i>(Please specify course ID & course title, if any)</i> ☒ Parallel course: <i>Advanced Engineering Drawing (CHE3414IU)</i> ☐ Previous course: <i>(Please specify course ID & course title, if any)</i>								
Course objectives	The aim of this course is to - Provide the ability of effectively construct and manage the engineering drawing complied with TCVN and ISO by using AutoCAD software. - Provide advanced knowledge for using and geometrical construction with the drawing instruments and AutoCAD software, the standard of presentation of engineering drawing.								
Course learning outcomes	Upon the successful completion of this course, students will be able to: <table border="1"> <thead> <tr> <th>Competency level¹</th><th>Course learning outcome (CLO)</th></tr> </thead> <tbody> <tr> <td>Knowledge</td><td>CLO1. Understand the criteria for engineering drawings and how to use AutoCAD to meet the conventional criteria [Applying].</td></tr> <tr> <td>Skill</td><td>CLO2. Use AutoCAD interface and drafting tools, mastering Autocad function and commands at high levels [Complex Overt Response]</td></tr> <tr> <td>Attitude</td><td>CLO3. Work independently and professionally [Valuing]</td></tr> </tbody> </table>	Competency level ¹	Course learning outcome (CLO)	Knowledge	CLO1. Understand the criteria for engineering drawings and how to use AutoCAD to meet the conventional criteria [Applying].	Skill	CLO2. Use AutoCAD interface and drafting tools, mastering Autocad function and commands at high levels [Complex Overt Response]	Attitude	CLO3. Work independently and professionally [Valuing]
Competency level ¹	Course learning outcome (CLO)								
Knowledge	CLO1. Understand the criteria for engineering drawings and how to use AutoCAD to meet the conventional criteria [Applying].								
Skill	CLO2. Use AutoCAD interface and drafting tools, mastering Autocad function and commands at high levels [Complex Overt Response]								
Attitude	CLO3. Work independently and professionally [Valuing]								
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i>								

¹ Level of competence according to Bloom's Taxonomy:

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x
Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination
Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x

	<u>Weight</u> : lecture session (4.2 hours)			
	<u>Teaching levels</u> : I (Introduce); T (Teach); U (Utilize)			
	No.	Topic	Weight	Level
	1	Read and interpret a drawing	1	I, T
	2	Analyze engineering drawing	1	I, T
	3	Generate a drawing	1	T, U
	4	Complete a drawing	1	T, U
	5	Modify a drawing	1	T, U
	6	Manage drawings	1	T, U
Examination forms	☐ Multiple-choice questions ☐ Oral examination ☐ Report ☐ Written examination ☐ Presentation ☒ Others, please specify: Constructed-response test ☐ Assignments			
Other requirements	<u>Attendance</u>: 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. <u>Assignments/Examination</u>: Students must have more than 50/100 points overall to pass this course.			
Reading list	I. Textbooks [1] George Omura, Brian C. Benton (2015), Mastering AutoCAD 2016 and AutoCAD LT 2016: Autodesk Official Press 1st Edition, Sybex Publisher 2015. II. References [2] Trần Hữu Quế – Nguyễn Văn Tuấn (2009), Vẽ kỹ thuật theo tiêu chuẩn quốc tế, NXB Bách Khoa Hà Nội.			

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	3						
	2							
	3							
Skills (Level: 1-7)	4							
	5					5		
	6							
Attitudes (Level: 1-5)	7							3
	8							
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	3.0	0.0	0.0	0.0	5.0	0.0	3.0
L,M,H conversion*		M				H		M

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Read and interpret a drawing	1,2	Attendance Q&A Homework 1	Reading materials before class; Doing the lecture; Demo on the computer; Practicing.	[1] 1-10
2.	2	Analyze engineering drawing	1,2	Attendance Q&A Homework 2	Reading materials before class; Doing the lecture; Demo on the computer; Practicing.	[1] 1-10

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
3.	3	Generate a drawing	1,2	Attendance Q&A Homework 3	Reading materials before class; Doing the lecture; Demo on the computer; Practicing,	[1] 1-10
4.	4	Complete a drawing	1,2	Attendance Q&A Homework 4	Reading materials before class; Doing the lecture; Demo on the computer; Practicing.	[1] 1-10
5.	5	Modify a drawing	1,2	Attendance Q&A Homework 5	Reading materials before class; Doing the lecture; Demo on the computer; Practicing.	[1] 1-10
6.	6	Manage drawings	1,2	Attendance Q&A Homework 6	Reading materials before class; Doing the lecture; Demo on the computer; Practicing.	[1] 1-10
7.	18-19	Final examination		Practice on computer		

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3
Class attendance (10%)			Attended 80%Pass
Home works (60%)			HW1-6, Submitted 80%Pass
Final exam (Fin, 30%)	60%Pass	60%Pass	

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

5. Rubrics (optional): No

6. Revision Date: May 20, 2023

Ho Chi Minh City, 20/5/2023

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	An ability to identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	An ability to communicate (in English) effectively with a range of audiences
4	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Environmental Chemistry 01

(Hóa Môi trường 1)

Course Code: CHE3121IU

1. General information

Course designation	This course is designed for students who are pursuing a degree in environmental engineering. Students will practice basic techniques for chemical analysis of common parameters to assess water quality. <i>Môn học này được thiết kế dành cho sinh viên theo học chương trình kỹ sư môi trường. Sinh viên sẽ thực hành các kỹ thuật cơ bản cho phân tích hóa học các thông số phổ biến để đánh giá chất lượng nước.</i>	
Teaching schedule	☒ Year 1 ☐ Year 2 ☐ Year 3 ☐ Year 4 ☐ Year 5 ☒ Semester 1 ☐ Semester 2 ☐ Summer	
Person In-Charge	Dr. Ngo Thi Thuan, ntthuan@hcmiu.edu.vn Template: (Name in Vietnamese order), (Email)	
Language	English	
Relation to curriculum	☐ General ☒ Fundamental ☐ Specialization ☐ Project/Internship/Thesis	☒ Compulsory ☐ Elective
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify: Experiment, report	

Workload			Lecture	Lab	Project	Internship	Thesis
		<i>Credit</i>	2	1			
	Contact hours	50	25	25	0	0	0
	Self-Study hours	90	60	30	0	0	0
	Total workload	140	85	55	0	0	0
Credit points	3						
Requirements for taking the course	☒ None ☐ Prerequisite course: <i>(Please specify course ID & course title, if any)</i> ☐ Parallel course: <i>(Please specify course ID & course title, if any)</i> ☐ Previous course: <i>(Please specify course ID & course title, if any)</i>						
Course objectives	Students are provided fundamental understanding of water chemistry including natural processes and pollution problems to water that will serve the students as a basis in all common phases of practice and research on environmental engineering, water pollution control, management, and monitoring water resource quality. Students will be provided professional skills and techniques to analyze common parameters in water quality assessment such as sample digestion, titration, spectroscopy, and distillation. Students will also be familiar with analytical devices such as UV-VIS, Kjeldahl system and further develop their scientific writing skills.						
Course learning outcomes	Upon the successful completion of this course, students will be able to:						
	Competency level	Course learning outcome (CLO)					
	Knowledge	CLO1. Define water quality, impurities/pollutants/contaminants, properties of contaminants, fates, and some behaviors of pollutants in natural waters					
	Skill	CLO2. Calculate fundamental theory, signification, and application of analytical methods for basic water quality parameters. CLO3. Demonstrate the ability to research, performing experimentation and knowledge discovery on solids, hardness, alkalinity, turbidity, DO, COD, BOD ₅ , nitrate, phosphate, sulfate, metal in water quality assessment procedure.					

	Attitude	CLO4. Be aware water resource conservation and environment protection to recognize the need for lifelong learning.		
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i>			
	<u>Weight</u> : lecture session (2.5 hours)			
	<u>Teaching levels</u> : I (Introduce); T (Teach); U (Utilize)			
	No.	Topic	Weight	Level
	1	Course introduction. Water quality	1	I, T
	2	Contaminant behavior in the water environment	1	I, T
	3	Major water quality parameters and applications: pH, Acidity – Alkalinity, Oxidation – reduction potential (ORP), Biochemical oxygen demand (BOD), chemical oxygen demand (COD), Total organic carbon, Turbidity, Color, Solid	3	T
	4	Nutrients and odors: nitrogen, phosphorus and sulfur.	3	T, U
	5	Behavior of metal species in the natural water.	1	T, U
	6	Case study	1	I, T
	7	Alkalinity in water	0.5	T
	8	Total Iron in water	0.5	T
	9	COD in water	0.5	T
	10	DO, pH, turbidity with sensors	0.5	T
	11	Solid/color in water	0.5	T
	12	BOD in water	0.5	T
	13	NH ₃ _N in water	0.5	T
14	NO ₂ _N in water	0.5	T	
15	Orthophosphate in water	0.5	T	

	16	Total phosphor/nitrogen in water	0.5	T
Examination forms	☐ Multiple-choice questions ☐ Oral examination ☒ Report ☒ Written examination ☐ Presentation ☒ Others, please specify: Free-response questions, lab work ☒ Assignments			
Other requirements	<u>Attendance:</u> 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. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.			
Reading list	I. Textbooks [1] Eugene R. Weiner (2013). Applications of Environmental Aquatic Chemistry – A Practical Guide. 3rd Edition. CRC Press. [2]. Patrick L. Brezonik and William A. Arnold (2011). Water chemistry. Oxford University Press [3]. E.W. Rice, R.B. Baird, and A.D. Eaton, (2017), Standard methods for the examination of water and wastewater, 23rd, American Public Health Association, American Water Works Association, Water Environment Federation. [4] Pradyot Patnaik, Handbook of Environmental Chemical Pollutants in Air, Water, Soil and Solid Wastes, CRC Press, USA, 1997. [5] Standard methods: ISO 17289:2014, ISO 5813:1983			

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	4					3	
Skills (Level: 1-7)	2	3	3			3		
	3		3	3	3	3	3	
Attitudes (Level: 1-5)	4	3					3	3
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	3.3	3.0	3.0	3.0	3.0	3.0	3.0
L,M,H conversion*		M	M	M	M	M	M	M

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1-2	Course introduction. Water quality introduction Contaminant behavior in the water environment	1,2	AS 1, 2	Lecture, Discussion, In class	[1] chapter 1 [2] chapter 2
2.	3-4	Major water quality parameters and applications: pH, Acidity – Alkalinity, Oxidation – reduction potential (ORP) Major water quality parameters and applications: Hardness, Dissolved oxygen, Biochemical oxygen demand, Chemical oxygen demand, Total organic carbon	3,4	AS 3,4	Lecture, Discussion, In class activities	[1] chapter 3 [2] chapter 4

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
3.	5-6	Major water quality parameters and applications: Turbidity, color, solid Nutrients and odors: Ammonia, nitrite and nitrate	3,4	AS 5,6	Lecture, Discussion, In class activities	[1] chapter 5 [2] chapter 4
4.	7-8	Nutrients and odors: Phosphorus, eutrophication, and algae problems Nutrients and odors: sulfide and hydrogen sulfide	3,4	AS 7,8	Lecture, Discussion, In class activities	[1] chapter 7 [2] chapter 6
5.	9,10	Midterm	1,3	A2		
6.	11	Behavior of metal species in the natural water	2,3	AS 9,10	Lecture, Discussion, In class activities	[1] chapter 8 [2] chapter 7
7.	13-17	Laboratory Alkalinity, total iron in water BOD, COD in water DO, pH, turbidity with sensors Dissolved oxygen in water by Winkler method NH ₃ _N and NO ₂ _N in water Orthophosphate & total phosphorus in water		Lab report 1-6	Discussion, Experimentation, lab report	[1]-[5]
8.	18	Final exam	1-4			

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
Midterm (20%)	Q1-5 50% pass	Q1-5 50% pass		
Assignment (30%)	AS 1-10 50% pass	AS 1-10 50% pass	AS 1-10 50% pass	
Final (30%)	Q1-8 50% pass		Q1-8 50% pass	
Lab report (20%)				Lab report 1-6 70% pass

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

5. Rubrics (optional):

6. Revision Date: May 20, 2023

Ho Chi Minh City, 20/5/2023

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Environmental Chemistry 02

(Hóa Môi trường 1)

Course Code: CHE3131IU

1. General information

Course designation	In this course students will use the fundamental principles of chemistry to gain an understanding of the source, fate, and reactivity of compounds in natural and polluted environments. Emphasis will be placed on the chemistry of the atmosphere, and lithosphere. The basic laboratory work supports lecture topics. <i>Trong môn học này, sinh viên sẽ sử dụng những nguyên tắc cơ bản của hóa học để hiểu về nguồn gốc, sự sống còn và tính phản ứng của các hợp chất trong môi trường tự nhiên và ô nhiễm. Sự tập trung sẽ được đặt vào hóa học của khí quyển và đá lưu. Công việc thực hành cơ bản hỗ trợ các chủ đề trong bài giảng.</i>	
Teaching schedule	☐ Year 1 ☐ Year 2 ☐ Year 3 ☒ Year 4 ☐ Year 5 ☒ Semester 1 ☐ Semester 2 ☐ Summer	
Person In-Charge	Dr. Ngo Thi Thuan, ntthuan@hcmiu.edu.vn Template: (Name in Vietnamese order), (Email)	
Language	English	
Relation to curriculum	☐ General ☐ Fundamental ☒ Specialization ☐ Project/Internship/Thesis	☐ Compulsory ☐ Elective
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify: Experiment, report	

Workload			Lecture	Lab	Project	Internship	Thesis								
		<i>Credit</i>	2	1											
	Contact hours	50	25	25	0	0	0								
	Self-Study hours	90	60	30	0	0	0								
	Total workload	140	85	55	0	0	0								
Credit points	3														
Requirements for taking the course	☒ None ☐ Prerequisite course: <i>(Please specify course ID & course title, if any)</i> ☐ Parallel course: <i>(Please specify course ID & course title, if any)</i> ☐ Previous course: <i>(Please specify course ID & course title, if any)</i>														
Course objectives	In this course students will use the fundamental principles of chemistry to gain an understanding of source, fate, and reactivity of compounds in natural and polluted environments. Emphasis will be placed on the chemistry of the atmosphere, and lithosphere. The basic laboratory work supports lecture topics.														
Course learning outcomes	Upon the successful completion of this course, students will be able to: <table border="1"> <thead> <tr> <th>Competency level</th> <th>Course learning outcome (CLO)</th> </tr> </thead> <tbody> <tr> <td>Knowledge</td> <td>CLO1. Comprehend the fundamental knowledge related to the atmosphere and atmospheric chemistry, gaseous inorganic air pollutants, organic air pollutants, greenhouse effect and climate change, photochemical smog, contaminated land, the natural of soil, the geosphere and geochemistry, soil and agricultural Environmental chemistry, partitioning and fate of heavy metals, persistence and fat of organic chemical pollutant, green chemistry and industrial ecology</td> </tr> <tr> <td>Skill</td> <td>CLO2. Demonstrate the ability to research an important environmental chemistry problem and prepare formal presentation on that problem. CLO3. Develop self-learning and researching skills.</td> </tr> <tr> <td>Attitude</td> <td>CLO4. Demonstrate experimental skills and knowledge discovery</td> </tr> </tbody> </table>							Competency level	Course learning outcome (CLO)	Knowledge	CLO1. Comprehend the fundamental knowledge related to the atmosphere and atmospheric chemistry, gaseous inorganic air pollutants, organic air pollutants, greenhouse effect and climate change, photochemical smog, contaminated land, the natural of soil, the geosphere and geochemistry, soil and agricultural Environmental chemistry, partitioning and fate of heavy metals, persistence and fat of organic chemical pollutant, green chemistry and industrial ecology	Skill	CLO2. Demonstrate the ability to research an important environmental chemistry problem and prepare formal presentation on that problem. CLO3. Develop self-learning and researching skills.	Attitude	CLO4. Demonstrate experimental skills and knowledge discovery
Competency level	Course learning outcome (CLO)														
Knowledge	CLO1. Comprehend the fundamental knowledge related to the atmosphere and atmospheric chemistry, gaseous inorganic air pollutants, organic air pollutants, greenhouse effect and climate change, photochemical smog, contaminated land, the natural of soil, the geosphere and geochemistry, soil and agricultural Environmental chemistry, partitioning and fate of heavy metals, persistence and fat of organic chemical pollutant, green chemistry and industrial ecology														
Skill	CLO2. Demonstrate the ability to research an important environmental chemistry problem and prepare formal presentation on that problem. CLO3. Develop self-learning and researching skills.														
Attitude	CLO4. Demonstrate experimental skills and knowledge discovery														
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i>														

	<u>Weight</u> : lecture session (2.5 hours)		
	<u>Teaching levels</u> : I (Introduce); T (Teach); U (Utilize)		
	No.	Topic	Weight
			Level
	1	Atmosphere, atmospheric chemistry and particles in the atmosphere	1.5
			I, T
	2	Air pollutants factors	1.5
			I,T
	3	Greenhouse effect	1.5
			I,T
	4	Contamination	5
			I,T
	5	Green chemistry	0.5
			I,T
	6	Laboratory, case studies	5
			I,T
Examination forms	☐ Multiple-choice questions ☐ Oral examination ☒ Report ☒ Written examination ☐ Presentation ☒ Others, please specify: Free-response questions ☒ Assignments		
Other requirements	<u>Attendance</u> : 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. <u>Assignments/Examination</u> : Students must have more than 50/100 points overall to pass this course.		
Reading list	I. Textbooks [1] Stanley E. Manahan, (2009). Environmental chemistry, 9th edition, Taylor and Francis Group [2] Colin Baird and Michael Cann, (2012). Environmental Chemistry, 5th edition, W.H. Freeman and Co, New York. [3] Raymond N.Yong, (2001), Geoenvironmental Engineering - Contaminated Soils, Pollutant, Fate, and Mitigation, CRC Press, Taylor & Francis Group.		

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	4					3	
Skills (Level: 1-7)	2	3	3			3		
	3		3	3	3	3	3	
Attitudes (Level: 1-5)	4	3					3	3
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	3.3	3.0	3.0	3.0	3.0	3.0	3.0
L,M,H conversion*		M	M	M	M	M	M	M

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Chapter 1: The atmosphere and atmospheric chemistry	1,2	AS 1	Lecture, Discussion, In class, assignment	[1]-[3]
2.	2	Chapter 2: Particles in the atmosphere	1,2	AS 2	Lecture, Discussion, In class, assignment	[1]-[3]
3.	3	Chapter 3: Gaseous inorganic air pollutants	1,2	AS 3	Lecture, Discussion, In class, assignment	[1]-[3]
4.	4	Chapter 4: Organic air pollutants	1,2	AS 4	Lecture, Discussion, In class, assignment	[1]-[3]
5.	5	Chapter 5: Greenhouse effect, climate change	1,2	AS 5	Lecture, Discussion, In class, assignment	[1]-[3]
6.	6	Chapter 6: Photochemical Smog	1,2	AS 6	Lecture, Discussion, In class, assignment	[1]-[3]
7.	7	Chapter 7: Contaminated land	1,2	AS 7	Lecture, Discussion, In class, assignment	[1]-[3]

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
8.	8	Chapter 8: The natural of soil	1,2	AS 8	Lecture, Discussion, In class, assignment	[1]-[3]
9.	9,10	Midterm	1,2			
10.	11	Chapter 9: The geosphere and Geochemistry	1,2	AS 9	Lecture, Discussion, In class, assignment	[1]-[3]
11.	12	Chapter 10: Soil and Agricultural Environmental Chemistry	1,2	AS 10	Lecture, Discussion, In class, assignment	[1]-[3]
12.	13-17	Laboratory Lecture 1: Introduction, Lab safety Lecture 2: Measurement of particles in the atmosphere Lecture 3: Measurement of SO ₂ in the atmosphere Lecture 4: Measurement of NO ₂ in the atmosphere Lecture 5: Measurement of CO ₂ in the atmosphere Lecture 6: Measurement of NH ₃ in the atmosphere Lecture 7: Measurement of O ₃ in the atmosphere Lecture 8: Measurement of moisture content, TS, TVS in the solid waste Lecture 9: Measurement of organic composition in the solid waste Lecture 10: Measurement of nitrogen in the solid waste Chapter 11: Partitioning and fate of heavy metals, persistence and fat of organic chemical pollutant	3,4	Report 1-5	Experimentation, lab report	[1]-[3]
13.	18	Final exam	1-4			

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
Midterm (20%)	Q1-5 50% pass	Q1-5 50% pass		
Assignment (30%)	AS 1-10 50% pass	AS 1-10 50% pass	AS 1-10 50% pass	
Final (30%)	Q1-8 50% pass		Q1-8 50% pass	
Lab report (20%)				Lab report 1-10 70% pass

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

5. Rubrics (optional): No

6. Revision Date: May 20, 2023

Ho Chi Minh City, 20/5/2023

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Heterogeneous Catalysis

(Xúc tác dị thể)

Course Code: CHE3231IU

1. General information

Course designation	More than 90% of all the chemical product formation processes are catalytic in nature and heterogeneous catalysis plays an enormous role. Heterogeneous catalysis plays a very important and defining role in most of the chemical industry. This course will be very useful for undergraduate and post-graduate students, and practitioners to understand heterogeneous catalytic processes. This course starts with basics of catalysis and goes deeper into various aspects of catalytic preparation and characterization techniques. Aspects of catalytic testing and reactor types are to be included. The topics will also include the study of reaction mechanism and kinetics of heterogeneous catalytic reactions. The effect of external and internal transport processes on reaction rates will be covered. Topics will include Modeling, parameter estimations and model discriminations. Catalyst deactivation, which is the main problem faced in heterogeneous catalytic process will be covered in detail. Various actual industrial catalytic processes will be discussed. New developments in catalysis will be covered. The concept of fuel cell catalysts, monolith catalysts and nanocatalysts will be introduced. The latest methods of catalyst design and corresponding simulations techniques will also be included in the course. Each topic will be developed progressively and associated with up-to-date information along with references. Wherever required the concepts will be illustrated with case studies and solved problems.
Teaching schedule	☐ Year 1 ☐ Year 2 ☐ Year 3 ☒ Year 4 ☐ Year 5
	☒ Semester 1 ☐ Semester 2 ☐ Summer
Person In-Charge	Dr. Phùng Thanh Khoa, ptkhoa@hcmiu.edu.vn
Language	English

Relation to curriculum	☐ General ☐ Fundamental ☒ Specialization ☐ Project/Internship/Thesis		☐ Compulsory ☒ Elective																																				
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify:																																						
Workload	<table border="1"> <tr> <td></td> <td></td> <td>Lecture</td> <td>Lab</td> <td>Project</td> <td>Internship</td> <td>Thesis</td> </tr> <tr> <td></td> <td><i>Credit</i></td> <td>3</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Contact hours</td> <td>37.5</td> <td>37.5</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>Self-Study hours</td> <td>90</td> <td>90</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>Total workload</td> <td>127.5</td> <td>127.5</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> </tr> </table>						Lecture	Lab	Project	Internship	Thesis		<i>Credit</i>	3					Contact hours	37.5	37.5	0	0	0	0	Self-Study hours	90	90	0	0	0	0	Total workload	127.5	127.5	0	0	0	0
		Lecture	Lab	Project	Internship	Thesis																																	
	<i>Credit</i>	3																																					
Contact hours	37.5	37.5	0	0	0	0																																	
Self-Study hours	90	90	0	0	0	0																																	
Total workload	127.5	127.5	0	0	0	0																																	
Credit points	3																																						
Requirements for taking the course	☒ None ☐ Prerequisite course: <i>(Please specify course ID & course title, if any)</i> ☐ Parallel course: <i>(Please specify course ID & course title, if any)</i> ☐ Previous course: <i>(Please specify course ID & course title, if any)</i>																																						
Course objectives	At the end of the course, students should be able to (i) understand the historic perspective and future developments of catalysis, (ii) be able to formulate reaction mechanisms for chemical reactions and to derive correlations between material properties and catalysis, (iii) understand various nanomaterial synthesis/characterization and in-situ catalysis characterization techniques, (iv) have a deep understanding on a variety of industrial practices for energy conversion and unitizations, especially renewable energy conversion techniques, (v) criticize the scientific work by other researches in materials, catalysis, and energy; (vi) come up with the approaches for literature review of their research background and apply the principles and techniques covered in the course to their own research project.																																						
Course learning outcomes	Upon the successful completion of this course, students will be able to: <table border="1" style="width: 100%;"> <tr> <th style="width: 15%;">Competency level¹</th> <th>Course learning outcome (CLO)</th> </tr> <tr> <td> </td> <td> </td> </tr> </table>				Competency level ¹	Course learning outcome (CLO)																																	
Competency level ¹	Course learning outcome (CLO)																																						

¹ Level of competence according to Bloom's Taxonomy:

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7

	Knowledge	CLO1. Have knowledge about the fundamental principles and experimental techniques used to study the five steps in a heterogeneously catalyzed reaction [Analyzing]. CLO2. Apply engineering design in heterogeneous catalysis processes [Evaluating].																				
	Skill	CLO3. Acquire and apply new knowledge as needed, using appropriate learning strategies [Complex Overt Response].																				
	Attitude	CLO4. Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts [Valuing].																				
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> <u>Weight</u>: lecture session (2.5 hours) <u>Teaching levels</u>: I (Introduce); T (Teach); U (Utilize) <table><tr><th>No.</th><th>Topic</th><th>Weight</th><th>Level</th></tr><tr><td>1</td><td>Heterogeneous catalytic processes, types of heterogeneous reactions.</td><td>1</td><td>I, T</td></tr><tr><td>2</td><td>Absorption, absorption isotherms, rates of absorption, physisorption and chemisorptions.</td><td>1</td><td>I, T</td></tr><tr><td>3</td><td>Solid catalysis, types of catalysts, catalyst formulations and preparation methods.</td><td>4</td><td>I, T</td></tr><tr><td>4</td><td>Catalysts characterization methods: surface area and pore volume determinations, XRD, various spectroscopic techniques, temperature programmed reduction and oxidation, electron microscopy.</td><td>1</td><td>I, T</td></tr></table>		No.	Topic	Weight	Level	1	Heterogeneous catalytic processes, types of heterogeneous reactions.	1	I, T	2	Absorption, absorption isotherms, rates of absorption, physisorption and chemisorptions.	1	I, T	3	Solid catalysis, types of catalysts, catalyst formulations and preparation methods.	4	I, T	4	Catalysts characterization methods: surface area and pore volume determinations, XRD, various spectroscopic techniques, temperature programmed reduction and oxidation, electron microscopy.	1	I, T
No.	Topic	Weight	Level																			
1	Heterogeneous catalytic processes, types of heterogeneous reactions.	1	I, T																			
2	Absorption, absorption isotherms, rates of absorption, physisorption and chemisorptions.	1	I, T																			
3	Solid catalysis, types of catalysts, catalyst formulations and preparation methods.	4	I, T																			
4	Catalysts characterization methods: surface area and pore volume determinations, XRD, various spectroscopic techniques, temperature programmed reduction and oxidation, electron microscopy.	1	I, T																			

Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x
Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination
Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x

	5	Testing of catalysts, various types of reactors, activity and selectivity studies.	1	I, T
	6	Effect of external transport processes on observed rate of reactions.	1	I, T
	7	Effect of internal transport processes: reactions and diffusion in porous catalysts.	1	I, T
	8	Mechanism of catalytic reactions, rates of adsorption, desorption, surface reactions, rate determining steps.	1	I, T
	9	Kinetic modelling and parameter estimations, model discriminations.	1	I, T
	10	Catalysts promoters, Inhibitors, catalyst deactivations, kinetics of catalyst deactivations.	1	I, T
	11	Industrial processes involving heterogeneous solid catalysts.	1	I, T
	12	New development in solid catalysis, monolith catalysts, nanocatalysts, fuel cell catalysts, environmental catalysts, in-situ characterization.	1	I, T
Examination forms	☐ Multiple-choice questions ☐ Oral examination ☐ Report ☒ Written examination ☐ Presentation ☐ Others, please specify: ☐ Assignments			
Other requirements	<u>Attendance:</u> 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. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.			
Reading list	I. Textbooks [1] C.H. Bartholomew, Robert J. Farrauto, <i>Fundamentals of Industrial Catalytic Processes</i>, 2nd edition, Wiley, 2010. [2]. Chorkendorff, J. W Niemantsverdriet, <i>Concept of Modern Catalysis and Kinetics</i>, 3rd Edition, Wiley, 2017.			

	II. References [1]. Bruce C. Gates, <i>Catalytic Chemistry</i> , Wiley, 1992 [2]. Roger Arthur Sheldon, Isabel W. C. E. Arends, Ulf Hanefeld, <i>Green Chemistry and Catalysis</i> , Wiley, 2007 [3]. M. Albert Vannice, <i>Kinetics of catalytic reactions</i> , Springer, 2005

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	4						
	2		5					
	3							
Skills (Level: 1-7)	4							
	5							
	6						5	
Attitudes (Level: 1-5)	7							3
	8							
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	4.0	5.0	0.0	0.0	0.0	5.0	3.0
L,M,H conversion*		H	H				H	M

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Heterogeneous catalytic processes, types of heterogeneous reactions.	1,3		- Lecture - Class discussion	[1]. [2].
2.	2	Absorption, absorption isotherms, rates of absorption, physisorption and chemisorptions.	1,3	Homework	- Lecture - Class discussion	[1]. [2].

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
3.	3-6	Solid catalysis, types of catalysts, catalyst formulations and preparation methods.	1,2	Homework	- Lecture - Class discussion	[1]. [2].
4.	7	Catalysts characterization methods: surface area and pore volume determinations, XRD, various spectroscopic techniques, temperature programmed reduction and oxidation, electron microscopy.	1,3	Homework	- Lecture - Class discussion	[1]. [2].
5.	8	Testing of catalysts, various types of reactors, activity and selectivity studies.	1	Quiz	- Lecture - Class discussion	[1]. [2].
6.	9	Midterm				
7.	10	Effect of external transport processes on observed rate of reactions.	1,2	Homework	- Lecture - Class discussion	[1]. [2].
8.	11	Effect of internal transport processes: reactions and diffusion in porous catalysts.	1,2	Quiz	- Lecture - Class discussion	[1]. [2].
9.	12	Mechanism of catalytic reactions, rates of adsorption, desorption, surface reactions, rate determining steps.	1,4	Homework	- Lecture - Class discussion	[1]. [2].
10.	13	Kinetic modelling and parameter estimations, model discriminations.	1,4	Quiz	- Lecture - Class discussion	[1]. [2].
11.	14	Catalysts promoters, Inhibitors, catalyst deactivations, kinetics of catalyst deactivations.	1,3	Homework	- Lecture - Class discussion	[1]. [2].
12.	15	Industrial processes involving heterogeneous solid catalysts.	1,2,4	Homework	- Lecture - Class discussion	[1]. [2].
13.	16	New development in solid catalysis, monolith catalysts, nanocatalysts, fuel cell catalysts, environmental catalysts, in-situ characterization.	1,2,4		- Lecture - Class discussion	[1]. [2].
14.	17	Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
In-class exercises/quizzes/ Homework (10%)	HW, Quiz 60%Pass	HW, Quiz 60%Pass		HW, Quiz 60%Pass
Group presentation (20%)	Group presentation 50%Pass	Group presentation 50%Pass	Group presentation 50%Pass	
Midterm exam (30%)		Q3 50%Pass	Q1, Q2 50%Pass	
Final exam (40%)	Part I 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): No

6. Revision Date: May 20, 2023

Ho Chi Minh City, 20/5/2023

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	An ability to identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	An ability to communicate (in English) effectively with a range of audiences
4	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Methods for Natural Products and Drugs
(Các phương pháp nghiên cứu cho hợp chất thiên nhiên và thuốc)

Course Code: CHE3324IU

1. General information

Course designation	This course is to introduce the special methods and techniques used in studying of natural products and drugs. Topics to be covered include: typical methods for separation and isolation of natural products; structure determination of organic compound by modern analysis such as NMR, MS, IR,..; total synthesis of drugs and organic compounds.		
Teaching schedule	☐ Year 1 ☐ Year 2 ☐ Year 3 ☒ Year 4 ☐ Year 5 ☒ Semester 1 ☐ Semester 2 ☐ Summer		
Person In-Charge	Dr. Le Quang Phong, lqphong@hcmiu.edu.vn Template: (Name in Vietnamese order), (Email)		
Language	English		
Relation to curriculum	☐ General ☐ Fundamental ☒ Specialization ☐ Project/Internship/Thesis	☐ Compulsory ☒ Elective	
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify:		

Workload			Lecture	Lab	Project	Internship	Thesis								
		<i>Credit</i>	2												
	Contact hours	25	25	0	0	0	0								
	Self-Study hours	60	60	0	0	0	0								
	Total workload	85	85	0	0	0	0								
Credit points	2														
Requirements for taking the course	☐ None ☐ Prerequisite course: <i>(Please specify course ID & course title, if any)</i> ☐ Parallel course: ☒ Previous course: Organic Chemistry 2 CHE1091IU; Analytical Chemistry 1 CHE1051IU; Analytical Chemistry 2 CHE1061IU														
Course objectives	The students will gain knowledge in separation and purification of natural products by using the chromatography techniques; be able to determinate structures of organic compounds by using instrument analysis methods; and to design the protocol and conduct the total synthesis of typical drugs; to practice important skills in synthesis and analysis of organic compounds; and can use lab equipment in isolation and synthesis of natural products and organic compounds.														
Course learning outcomes	Upon the successful completion of this course, students will be able to: <table border="1" style="width: 100%;"> <tr> <th>Competency level</th> <th>Course learning outcome (CLO)</th> </tr> <tr> <td>Knowledge</td> <td>CLO1. Demonstrate knowledge in separation and purification of natural products by using the chromatography techniques. [2]</td> </tr> <tr> <td>Skill</td> <td>CLO2. Determinate the structures of organic compounds by using instrument analysis methods; design the protocol and conduct the total synthesis of typical drugs; to practice important skills in synthesis and analysis of organic compounds. [4]</td> </tr> <tr> <td>Attitude</td> <td>CLO3. Demonstrate reasoned decisions which reflect ethical standards and responsibilities, and act in accordance with those decisions.[3]</td> </tr> </table>							Competency level	Course learning outcome (CLO)	Knowledge	CLO1. Demonstrate knowledge in separation and purification of natural products by using the chromatography techniques. [2]	Skill	CLO2. Determinate the structures of organic compounds by using instrument analysis methods; design the protocol and conduct the total synthesis of typical drugs; to practice important skills in synthesis and analysis of organic compounds. [4]	Attitude	CLO3. Demonstrate reasoned decisions which reflect ethical standards and responsibilities, and act in accordance with those decisions.[3]
Competency level	Course learning outcome (CLO)														
Knowledge	CLO1. Demonstrate knowledge in separation and purification of natural products by using the chromatography techniques. [2]														
Skill	CLO2. Determinate the structures of organic compounds by using instrument analysis methods; design the protocol and conduct the total synthesis of typical drugs; to practice important skills in synthesis and analysis of organic compounds. [4]														
Attitude	CLO3. Demonstrate reasoned decisions which reflect ethical standards and responsibilities, and act in accordance with those decisions.[3]														
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> <u>Weight:</u> lecture session (2.5 hours) <u>Teaching levels:</u> I (Introduce); T (Teach); U (Utilize)														
	No.	Topic	Weight	Level											

	1	Introduction to Operations Research	1	I, T
	2	Study in natural products Separate determinate components of essential oils from plants by GC-MS; isolate natural products from essential oils. Theoretical study	1	I, T
	3	Study in natural products Extract and purify natural compounds from extracts of plants by using thin layer and column chromatography. Theoretical study	1	I, T
	4	Study in natural products identify organic compounds by analysis of the spectrums of NMR, MS, IR,....Theoretical study	2	U, T
	5	Total synthesis of drugs design the protocol and introduce chemicals and conditions for synthesis of organic compounds. Theoretical study	2	U, T
Examination forms	☒ Multiple-choice questions ☐ Oral examination ☐ Report ☒ Written examination ☐ Presentation ☐ Others, please specify: ☒ Assignments			
Other requirements	<u>Attendance:</u> 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. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.			
Reading list	I. Textbooks [1] Organic chemistry of drug synthesis, Vol. 1-4 II. References [1] Organic chemistry, J. McMurry. 8th edition			

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-3) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	2						
Skills (Level: 1-7)	2						4	
Attitudes (Level: 1-5)	3							3
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	2,0	0,0	0,0	0,0	0,0	4,0	3,0
L,M,H conversion*		L					H	M

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Introduction to Operations Research	1		- Lecture -Class discussion	
2.	2,3	Study in natural products Separate determinate components of essential oils from plants by GC-MS; isolate natural products from essential oils. Theoretical study	1	Assignment	- Lecture -Class discussion	
3.	4, 5, 6	Study in natural products Extract and purify natural compounds from extracts of plants by using thin layer and column chromatography. Theoretical study	1	Assignment	- Lecture -Class discussion	
4.	7, 8	Study in natural products identify organic compounds by analysis of the spectrums of NMR, MS, IR,....Theoretical study	2	Quiz	- Lecture -Class discussion	
5.	9-10	Midterm	1-2			

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
6.	11, 12,	Total synthesis of drugs design the protocol and introduce chemicals and conditions for synthesis of organic compounds. Theoretical study The aldol reactions	2,3	Quiz	- Lecture -Class discussion	
7.		Final Exam (Mini report)	1-3			

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3
Assignment, Quiz (30%)	Quiz Assignment 50%Pass	Quiz Assignment 50%Pass	Quiz, Assignment 50 %Pass
Midterm exam (30%)	50%Pass	50%Pass	
Final exam (Mini project) (40%)	50 % Pass	50 % Pass	50 % Pass

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

5. Rubrics (optional): No

6. Revision Date: May 20, 2023

Ho Chi Minh City, 20/5/2023

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



**VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY**
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Laboratory in Methods for Natural Products and Drugs
(Thực hành các phương pháp nghiên cứu cho hợp chất thiên nhiên và thuốc)

Course Code: CHE3325IU

1. General information

Course designation	This course is the laboratory part of the Methods for Natural products and drugs course. The course is to introduce the special methods and techniques used in studying of natural products and drugs. Topics to be covered include: typical methods for separation and isolation of natural products; structure determination of organic compound by modern analysis such as NMR, MS, IR,...; total synthesis of drugs and organic compounds.		
Teaching schedule	☐ Year 1 ☐ Year 2 ☐ Year 3 ☒ Year 4 ☐ Year 5 ☒ Semester 1 ☐ Semester 2 ☐ Summer		
Person In-Charge	Dr. Le Quang Phong, lqphong@hcmiu.edu.vn Template: (Name in Vietnamese order), (Email)		
Language	English		
Relation to curriculum	☐ General ☐ Fundamental ☒ Specialization ☐ Project/Internship/Thesis	☐ Compulsory ☒ Elective	
Teaching methods	☐ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify: Laboratory		

Workload			Lecture	Lab	Project	Internship	Thesis
		<i>Credit</i>	0	1			
	Contact hours	25	0	25	0	0	0
	Self-Study hours	30	0	30	0	0	0
	Total workload	55	0	55	0	0	0
Credit points	1						
Requirements for taking the course	☐ None ☐ Prerequisite course: <i>(Please specify course ID & course title, if any)</i> ☐ Parallel course: Methods for Natural Products and Drugs CHE3324IU ☒ Previous course: Organic Chemistry 2 CHE1091IU; Analytical Chemistry 1 CHE1051IU; Analytical Chemistry 2 CHE1061IU						
Course objectives	The students will practice important skills in synthesis and analysis of organic compounds; and can use lab equipment in isolation and synthesis of natural products and organic compounds.						
Course learning outcomes	Upon the successful completion of this course, students will be able to:						
	Competency level	Course learning outcome (CLO)					
	Knowledge	CLO1. Utilize basic knowledge gained from General Chemistry course to perform common calculations, including mass balance, limiting reagent, and percent yield. [2] CLO2. Draw the mechanism and understand the functions of reagents in drug synthesis reactions. Characterize prepared substances by physical/spectroscopic means.[3]					
	Skill	CLO3. Develop laboratory skills in handling chemical, assembling glassware and performing the following techniques as a part of synthetic procedures: distillation, reflux, separation, isolation, and crystallization.[4] CLO4. Ability to analyze, predict, and explain many aspects of everyday life using laboratory skills and organic chemistry concepts.[4]					
	Attitude	CLO5. Engage in safe laboratory practices by handling laboratory glassware, equipment, and chemical reagents appropriately, using general guidelines and basic knowledge about the common hazards associated with them in an organic chemistry laboratory.[2]					

Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> <u>Weight</u>: lecture session (2.5 hours) <u>Teaching levels</u>: I (Introduce); T (Teach); U (Utilize) <table><tr><th>No.</th><th>Topic</th><th>Weight</th><th>Level</th></tr><tr><td>1</td><td>Lab Use lab equipment and technical skills in isolation, purification of natural products and synthesis of organic compounds</td><td>1</td><td>I, T, U</td></tr><tr><td>2</td><td>Lab Conduct experiments to separate, isolate, purify, identify natural products (Glucoraphanin, Cucummin,..) from essential oils and extracts of plants.</td><td>2</td><td>I, T, U</td></tr><tr><td>3</td><td>Lab to synthesize some typical drugs such as Aspirin, Paracetamol,...</td><td>2</td><td>I, T, U</td></tr></table>				No.	Topic	Weight	Level	1	Lab Use lab equipment and technical skills in isolation, purification of natural products and synthesis of organic compounds	1	I, T, U	2	Lab Conduct experiments to separate, isolate, purify, identify natural products (Glucoraphanin, Cucummin,..) from essential oils and extracts of plants.	2	I, T, U	3	Lab to synthesize some typical drugs such as Aspirin, Paracetamol,...	2	I, T, U
No.	Topic	Weight	Level																	
1	Lab Use lab equipment and technical skills in isolation, purification of natural products and synthesis of organic compounds	1	I, T, U																	
2	Lab Conduct experiments to separate, isolate, purify, identify natural products (Glucoraphanin, Cucummin,..) from essential oils and extracts of plants.	2	I, T, U																	
3	Lab to synthesize some typical drugs such as Aspirin, Paracetamol,...	2	I, T, U																	
Examination forms	☒ Multiple-choice questions☐ Oral examination ☒ Report☒ Written examination ☐ Presentation☐ Others, please specify: ☐ Assignments																			
Other requirements	<u>Attendance</u>: An attendance of 100 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. <u>Assignments/Examination</u>: Students must have more than 50/100 points overall to pass this course.																			
Reading list	I. Textbooks [1] Purification of Lab Chemicals –Fifth edition, Wilfred L. E Armarego II. References [1] Organic chemistry, J. McMurry. 8th edition																			

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-5) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	2						
	2	2					3	
Skills (Level: 1-7)	3					4		
	4							4
Attitudes (Level: 1-5)	5							2
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	2,0	0,0	0,0	0,0	4,0	3,0	3,0
L,M,H conversion*		L				H	M	M

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Lab Use lab equipment and technical skills in isolation, purification of natural products and synthesis of organic compounds	1,2,3,5	Quiz Report	- Lecture - Laboratory	
2.	2,3	Lab Conduct experiments to separate, isolate, purify, identify natural products (Glucoraphanin, Cucummin,..) from essential oils and extracts of plants.	1,3,5	Quiz Report	- Lecture - Laboratory	
3.	4, 5	Lab	2,4,5	Quiz Report	- Lecture - Laboratory	

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
		to synthesize some typical drugs such as Aspirin, Paracetamol,...				
4.		Final Exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4	CLO5
Quiz (20%)	Quiz Assignment 50%Pass	Quiz Assignment 50%Pass	Quiz, Assignment 50 %Pass	Quiz, Assignment 50 %Pass	Quiz, Assignment 50 %Pass
Report (50%)	50 % Pass	50 % Pass	50 % Pass	50 % Pass	50 % Pass
Final exam (30%)	50 % Pass	50 % Pass	50 % Pass	50 % Pass	50 % Pass

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

5. Rubrics (optional): No

6. Revision Date: May 20, 2023

Ho Chi Minh City, 20/5/2023

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Piping and Instruments System Design

(Thiết kế đường ống và thiết bị)

Course Code: CHE3421IU

1. General information

Course designation	This course equips students with principles and practices of designing “Piping and Instrumentation Diagram - P & ID Diagram” for the process industries. More specifically, the main contents of this course are: 1. Principles and practices for creating / designing P& ID diagrams that satisfy requirements on operability and controllability of the process, as well as requirement on process safety. 2. Knowledge related to drawing / presenting equipment and instruments on the P & ID, as well as presenting technical information that describes characteristics of equipment and instruments on the P&ID 3. Knowledge related to drawing P & ID	
Teaching schedule	☐ Year 1 ☐ Year 2 ☐ Year 3 ☒ Year 4 ☐ Year 5 ☒ Semester 1 ☐ Semester 2 ☐ Summer	
Person In-Charge	Dr. Nguyen Thanh Duy Quang, ntdquang@hcmut.edu.vn	
Language	English	
Relation to curriculum	☐ General ☐ Fundamental ☒ Specialization ☐ Project/Internship/Thesis	☐ Compulsory ☒ Elective
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify:	

Workload			Lecture	Lab	Project	Internship	Thesis
		<i>Credit</i>	3				
	Contact hours	37.5	37.5	0	0	0	0
	Self-Study hours	90	90	0	0	0	0
	Total workload	127.5	127.5	0	0	0	0
Credit points	3						
Requirements for taking the course	☒ None ☐ Prerequisite course: <i>(Please specify course ID & course title, if any)</i> ☐ Parallel course: <i>(Please specify course ID & course title, if any)</i> ☐ Previous course: <i>(Please specify course ID & course title, if any)</i>						
Course objectives	• Read and understand P & ID drawing • Select and specify valves, pipes and piping components, pumps in the design of P & ID drawing • Design the basic process control system (BPCS) and present results on P & ID drawing • Create, design a P & ID drawing						
Course learning outcomes	Upon the successful completion of this course, students will be able to:						
	Competency level¹	Course learning outcome (CLO)					
	Knowledge	CLO1. Read and understand P & ID drawing [Evaluating]. CLO2. Select and specify valves, pipes and piping components, pumps; design the basic process control system (BPCS) in the design of P & ID drawing [Evaluating].					

¹ Level of competence according to Bloom's Taxonomy:

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x
Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination
Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x

	<table><tr><td>Skill</td><td>CLO3. Create, design a P & ID drawing [Complex Overt Response]</td></tr><tr><td>Attitude</td><td>CLO4. Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal context [Valuing]</td></tr></table>	Skill	CLO3. Create, design a P & ID drawing [Complex Overt Response]	Attitude	CLO4. Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal context [Valuing]																																								
Skill	CLO3. Create, design a P & ID drawing [Complex Overt Response]																																												
Attitude	CLO4. Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal context [Valuing]																																												
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> <u>Weight</u>: lecture session (2.5 hours) <u>Teaching levels</u>: I (Introduce); T (Teach); U (Utilize) <table><tr><th>No.</th><th>Topic</th><th>Weight</th><th>Level</th></tr><tr><td>1</td><td>Introduction to P&ID design</td><td>1</td><td>I, T</td></tr><tr><td>2</td><td>Management of P&ID Development</td><td>1</td><td>I, T</td></tr><tr><td>3</td><td>Principles of P & ID Development</td><td>1</td><td>T, U</td></tr><tr><td>4</td><td>P&ID Design for fluid transportation (pipes and piping components, pumps, compressors)</td><td>2</td><td>T, U</td></tr><tr><td>5</td><td>Measurement sensors and process instruments</td><td>2</td><td>T, U</td></tr><tr><td>6</td><td>Valve Selection - Control Valve Sizing</td><td>2</td><td>T, U</td></tr><tr><td>7</td><td>Designing the Basic Process Control System</td><td>2</td><td>T, U</td></tr><tr><td>8</td><td>Design of process safeguarding systems</td><td>2</td><td>T, U</td></tr><tr><td>9</td><td>P&ID design for process equipment</td><td>1</td><td>T, U</td></tr><tr><td>10</td><td>Illustration examples</td><td>1</td><td>T, U</td></tr></table>	No.	Topic	Weight	Level	1	Introduction to P&ID design	1	I, T	2	Management of P&ID Development	1	I, T	3	Principles of P & ID Development	1	T, U	4	P&ID Design for fluid transportation (pipes and piping components, pumps, compressors)	2	T, U	5	Measurement sensors and process instruments	2	T, U	6	Valve Selection - Control Valve Sizing	2	T, U	7	Designing the Basic Process Control System	2	T, U	8	Design of process safeguarding systems	2	T, U	9	P&ID design for process equipment	1	T, U	10	Illustration examples	1	T, U
No.	Topic	Weight	Level																																										
1	Introduction to P&ID design	1	I, T																																										
2	Management of P&ID Development	1	I, T																																										
3	Principles of P & ID Development	1	T, U																																										
4	P&ID Design for fluid transportation (pipes and piping components, pumps, compressors)	2	T, U																																										
5	Measurement sensors and process instruments	2	T, U																																										
6	Valve Selection - Control Valve Sizing	2	T, U																																										
7	Designing the Basic Process Control System	2	T, U																																										
8	Design of process safeguarding systems	2	T, U																																										
9	P&ID design for process equipment	1	T, U																																										
10	Illustration examples	1	T, U																																										
Examination forms	<table><tr><td>☐ Multiple-choice questions</td><td>☐ Oral examination</td></tr><tr><td>☐ Report</td><td>☒ Written examination</td></tr><tr><td>☐ Presentation</td><td>☐ Others, please specify:</td></tr><tr><td>☐ Assignments</td><td></td></tr></table>	☐ Multiple-choice questions	☐ Oral examination	☐ Report	☒ Written examination	☐ Presentation	☐ Others, please specify:	☐ Assignments																																					
☐ Multiple-choice questions	☐ Oral examination																																												
☐ Report	☒ Written examination																																												
☐ Presentation	☐ Others, please specify:																																												
☐ Assignments																																													
Other requirements	<u>Attendance</u>: 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.																																												

	<u>Assignments/Examination</u> : Students must have more than 50/100 points overall to pass this course.
Reading list	I. Textbooks [1]. Moe Toghræi. <i>"Piping and Instrumentation Diagram Development"</i>, Wiley, 2019 [2]. Franklyn W. Kirk, Thomas A. Weedon, Philip Kirk. <i>Instrumentation</i>, 5th Ed, American Technical Publishers, Inc, 2010 [3]. Ray Sinnott and Gavin Towler. Chapter 5 <i>"PIPING AND INSTRUMENTATION"</i> in the book <i>"Chemical Engineering Design"</i>, Elsevier, 2019 [4]. Charles E. Thomas. Chapter 11 and Chapter 12 in the book <i>"Process Technology Equipment and Systems, 4th Edition"</i>, Cengage Learning, 2015 II. References

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	5						
	2		5					
	3							
Skills (Level: 1-7)	4							
	5					5		
	6							
Attitudes (Level: 1-5)	7							3
	8							
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	5.0	5.0	0.0	0.0	5.0	0.0	3.0
L,M,H conversion*		H	H			H		M

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Introduction to P&ID design	1	Midterm exam	Lecture, Discussion	[1] [3] [4]
2.	2	Management of P&ID Development	1	Midterm exam	Lecture, Discussion	[1] [3] [4]
3.	3	Principles of P & ID Development	2, 3	Midterm exam	Lecture, Discussion	[1] [3] [4]
4.	4-5	P&ID Design for fluid transportation (pipes and piping components, pumps, compressors)	2, 3	Midterm exam	Lecture, Discussion	[1] [3] [4]
5.	6, 7	Measurement sensors and process instruments	2, 3	Midterm exam	Lecture, Discussion	[1] [2]
6.	8, 10	Valve Selection - Control Valve Sizing	2, 3	Final Exam HW1	Lecture, Discussion	[1] [3] [4]
7.	9	Midterm				
8.	11-12	Designing the Basic Process Control System	2, 3	Final exam HW2	Lecture, Discussion, HW	[1] [3] [4]
9.	13-14	Design of process safeguarding systems	2, 3	Final exam HW3	Lecture, Discussion, HW	[1] [3] [4]
10.	15	P&ID design for process equipment	2, 3	Final exam HW3	Lecture, Discussion, HW	[1] [3] [4]
11.	16	Illustration examples	3,4	Final exam	Lecture, Discussion	[1] [3]

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
						[4]
12.	17	Final exam				

4.

5. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
Homework exercises (30%)		HW1 80%Pass	HW2 80%Pass	
Midterm exam (30%)	Q1 80%Pass	Q2 80%Pass		
Final exam (40%)		Part II.1 80%Pass	Part II.2 80%Pass	Part II.3 80%Pass

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

6. Rubrics (optional): No

7. Revision Date: May 20, 2023

Ho Chi Minh City, 20/5/2023

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	An ability to identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	An ability to communicate (in English) effectively with a range of audiences
4	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: SUSTAINABLE ENERGY

(Tiếng Việt)

Course Code: CHE3141IU

1. General information

Course designation	This course will introduce students with concepts of sustainable energy conversion. Some of the main energy conversion such as solar, wind, hydroelectricity, hydrogen, biomass and geothermal energy together with technologies of energy storage will be discussed. <i>Môn học này sẽ giới thiệu cho sinh viên các khái niệm về quá trình chuyển đổi năng lượng bền vững. Một số quá trình chuyển đổi năng lượng chính như năng lượng mặt trời, năng lượng gió, năng lượng thủy điện, năng lượng hydro, sinh khối và năng lượng địa nhiệt cùng với các công nghệ lưu trữ năng lượng sẽ được thảo luận.</i>	
Teaching schedule	☐ Year 1 ☐ Year 2 ☐ Year 3 ☒ Year 4 ☐ Year 5 ☐ Semester 1 ☒ Semester 2 ☐ Summer	
Person In-Charge	Dr. Doan Hoai Linh, dhlhinh@hcmiu.edu.vn Template: (Name in Vietnamese order), (Email)	
Language	English	
Relation to curriculum	☐ General ☐ Fundamental ☐ Specialization ☐ Project/Internship/Thesis	☒ Compulsory ☐ Elective
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify:	

Workload			Lecture	Lab	Project	Internship	Thesis				
		<i>Credit</i>	3								
	Contact hours	37.5	37.5	0	0	0	0				
	Self-Study hours	90	90	0	0	0	0				
	Total workload	127.5	127.5	0	0	0	0				
Credit points	3										
Requirements for taking the course	☒ None ☐ Prerequisite course: <i>(Please specify course ID & course title, if any)</i> ☐ Parallel course: <i>(Please specify course ID & course title, if any)</i> ☐ Previous course: <i>(Please specify course ID & course title, if any)</i>										
Course objectives	Upon successful completion of this course, the students should demonstrate knowledge of: • Energy conversion, storage and consumption • The impact of the various energy conversion and storage technologies, as well as paths of energy use/consumption. • Feasibility/cost of the most prominent sustainable energy conversion methods. • Challenges to achieve sustainable energy conversion. • Understand the fundamentals of sustainable energy, fossil fuels, solar power, photovoltaics, nuclear energy, energy storage, ocean hydropower, geothermal energy, biofuels, and the economics of energy. Develop the skills required to work as a member of a group Apply the knowledge learnt in class to solve real-life problem.										
Course learning outcomes	Upon the successful completion of this course, students will be able to: <table border="1"> <thead> <tr> <th>Competency level</th> <th>Course learning outcome (CLO)</th> </tr> </thead> <tbody> <tr> <td>Knowledge</td> <td> CLO1. Understand the fundamentals of sustainable energy, fossil fuels, solar power, photovoltaics, nuclear energy, energy storage, ocean hydropower, geothermal energy, biofuels, and the economics of energy. CLO2. Understand the impact of the various energy conversion and storage technologies, as well as paths of energy use/consumption, and the sustainable energy conversion methods. </td> </tr> </tbody> </table>							Competency level	Course learning outcome (CLO)	Knowledge	CLO1. Understand the fundamentals of sustainable energy, fossil fuels, solar power, photovoltaics, nuclear energy, energy storage, ocean hydropower, geothermal energy, biofuels, and the economics of energy. CLO2. Understand the impact of the various energy conversion and storage technologies, as well as paths of energy use/consumption, and the sustainable energy conversion methods.
Competency level	Course learning outcome (CLO)										
Knowledge	CLO1. Understand the fundamentals of sustainable energy, fossil fuels, solar power, photovoltaics, nuclear energy, energy storage, ocean hydropower, geothermal energy, biofuels, and the economics of energy. CLO2. Understand the impact of the various energy conversion and storage technologies, as well as paths of energy use/consumption, and the sustainable energy conversion methods.										

	<table><tr><td>Skill</td><td>CLO3. Able to calculate energy consumption for different types of energy, performing cost-analysis for each energy system to solve real-life problems.</td></tr><tr><td>Attitude</td><td>CLO4. Understanding of professional and ethical responsibility, a recognition of the need for, and an ability to engage in life-long learning</td></tr></table>	Skill	CLO3. Able to calculate energy consumption for different types of energy, performing cost-analysis for each energy system to solve real-life problems.	Attitude	CLO4. Understanding of professional and ethical responsibility, a recognition of the need for, and an ability to engage in life-long learning																								
Skill	CLO3. Able to calculate energy consumption for different types of energy, performing cost-analysis for each energy system to solve real-life problems.																												
Attitude	CLO4. Understanding of professional and ethical responsibility, a recognition of the need for, and an ability to engage in life-long learning																												
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> <u>Weight</u>: lecture session (2.5 hours) <u>Teaching levels</u>: I (Introduce); T (Teach); U (Utilize) <table><tr><th>No.</th><th>Topic</th><th>Weight</th><th>Level</th></tr><tr><td>1</td><td>Introduction to Sustainable energy Fossil fuels</td><td>3</td><td>I,T,U</td></tr><tr><td>2</td><td>Economics of Energy Generation and Conservation System</td><td>3</td><td>T,U</td></tr><tr><td>3</td><td>Fundamentals of solar radiation Photovoltaics Solar Process Heat and Thermal Power Passive Solar Heating, Cooling, and Daylighting</td><td>3</td><td>T,U</td></tr><tr><td>4</td><td>Capturing solar energy through biomass Wind energy</td><td>2</td><td>T,U</td></tr><tr><td>5</td><td>Nuclear energy Energy storage</td><td>2</td><td>T,U</td></tr><tr><td>6</td><td>Ocean hydropower, and geothermal energy conversion</td><td>2</td><td>T,U</td></tr></table>	No.	Topic	Weight	Level	1	Introduction to Sustainable energy Fossil fuels	3	I,T,U	2	Economics of Energy Generation and Conservation System	3	T,U	3	Fundamentals of solar radiation Photovoltaics Solar Process Heat and Thermal Power Passive Solar Heating, Cooling, and Daylighting	3	T,U	4	Capturing solar energy through biomass Wind energy	2	T,U	5	Nuclear energy Energy storage	2	T,U	6	Ocean hydropower, and geothermal energy conversion	2	T,U
No.	Topic	Weight	Level																										
1	Introduction to Sustainable energy Fossil fuels	3	I,T,U																										
2	Economics of Energy Generation and Conservation System	3	T,U																										
3	Fundamentals of solar radiation Photovoltaics Solar Process Heat and Thermal Power Passive Solar Heating, Cooling, and Daylighting	3	T,U																										
4	Capturing solar energy through biomass Wind energy	2	T,U																										
5	Nuclear energy Energy storage	2	T,U																										
6	Ocean hydropower, and geothermal energy conversion	2	T,U																										
Examination forms	<table><tr><td>☐ Multiple-choice questions</td><td>☐ Oral examination</td></tr><tr><td>☐ Report</td><td>☒ Written examination</td></tr><tr><td>☒ Presentation</td><td>☐ Others, please specify:</td></tr><tr><td>☐ Assignments</td><td></td></tr></table>	☐ Multiple-choice questions	☐ Oral examination	☐ Report	☒ Written examination	☒ Presentation	☐ Others, please specify:	☐ Assignments																					
☐ Multiple-choice questions	☐ Oral examination																												
☐ Report	☒ Written examination																												
☒ Presentation	☐ Others, please specify:																												
☐ Assignments																													

Other requirements	<u>Attendance:</u> 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. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.
Reading list	I. Textbooks [1] Kreith, Frank, Principles of Sustainable Energy Systems, CRC Press (2013)

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	2					3	
Skills (Level: 1-7)	2	2	3			4	3	
	3		3	3	3	4		
Attitudes (Level: 1-5)	4						3	2
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	2.0	3.0	3.0	3.0	4.0	3.0	2.0
L,M,H conversion*		L	M	M	M	M	M	L

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1-2	Introduction to Sustainable energy Fossil fuels	1,2	Presentation, Group problems 1, Quiz 1	Lecture, Group work, Presentation, assignment, design problems	[1]
2.	3-4	Economics of Energy Generation and Conservation System	1,2	Presentation, Group problems 1, Quiz 2	Lecture, Group work, Presentation, assignment,	[1]

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
					design problems	
3.	5-8	Fundamentals of solar radiation Photovoltaics Solar Process Heat and Thermal Power Passive Solar Heating, Cooling, and Daylighting	1,2	Presentation, Group problems 1, Quiz 3	Lecture, Group work, Presentation, assignment, design problems	[1]
4.	9	Midterm				
5.	11-12	Capturing solar energy through biomass Wind energy	3,4	Presentation, Group problems 2, Quiz 4	Lecture, Group work, Presentation, assignment, design problems	[1]
6.	13-14	Nuclear energy Energy storage	3,4	Presentation, Group problems 2, Quiz 5	Lecture, Group work, Presentation, assignment, design problems	[1]
7.	15-16	Ocean hydropower, and geothermal energy conversion	3,4	Presentation, Group problems 2, Quiz 6	Lecture, Group work, Presentation, assignment, design problems	[1]
8.	17	Final				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
Quiz (10%)	Quiz 1-6 50% pass	Quiz 1-6 50% pass	Quiz 1-6 50% pass	

Assessment Type	CLO1	CLO2	CLO3	CLO4
Presentation (10%)			Presentation 50% pass	Presentation 50% pass
Design Group Problems (10%)	Group problems 50% pass	Group problems 50% pass	Group problems 50% pass	Group problems 50% pass
Midterm Exam (30%)	Q1-4 50% pass	Q1-4 50% pass		
Final Exam (40%)	Q1 50% pass	Q1 50% pass	Q1 50% pass	Q1 50% pass

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

5. Rubrics (optional): No

6. Revision Date: May 20, 2023

Ho Chi Minh City, 20/5/2023

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Natural Gas Processing

(Chế biến khí thiên nhiên)

Course Code: CHE3151IU

1. General information

Course designation	This course is to provide an overview of chemical processes typically implemented to process the natural gas extracted from the ground into a valuable commodity. This course includes basic elements of economic analysis, optimization, and the description of a few unit operations that are essential for the implementation of natural gas processing plants.																																								
Teaching schedule	☐ Year 1 ☐ Year 2 ☐ Year 3 ☒ Year 4 ☐ Year 5 ☒ Semester 1 ☐ Semester 2 ☐ Summer																																								
Person In-Charge	Dr. Phùng Thanh Khoa, ptkhoa@hcmiu.edu.vn																																								
Language	English																																								
Relation to curriculum	☐ General ☐ Fundamental ☒ Specialization ☐ Project/Internship/Thesis			☐ Compulsory ☒ Elective																																					
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify:																																								
Workload	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th></th><th></th><th>Lecture</th><th>Lab</th><th>Project</th><th>Internship</th><th>Thesis</th></tr> </thead> <tbody> <tr> <td></td><td><i>Credit</i></td><td>3</td><td></td><td></td><td></td><td></td></tr> <tr> <td>Contact hours</td><td>37.5</td><td>37.5</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td>Self-Study hours</td><td>90</td><td>90</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td>Total workload</td><td>127.5</td><td>127.5</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> </tbody> </table>								Lecture	Lab	Project	Internship	Thesis		<i>Credit</i>	3					Contact hours	37.5	37.5	0	0	0	0	Self-Study hours	90	90	0	0	0	0	Total workload	127.5	127.5	0	0	0	0
		Lecture	Lab	Project	Internship	Thesis																																			
	<i>Credit</i>	3																																							
Contact hours	37.5	37.5	0	0	0	0																																			
Self-Study hours	90	90	0	0	0	0																																			
Total workload	127.5	127.5	0	0	0	0																																			

Credit points	3				
Requirements for taking the course	☒ None ☐ Prerequisite course: <i>(Please specify course ID & course title, if any)</i> ☐ Parallel course: <i>(Please specify course ID & course title, if any)</i> ☐ Previous course: <i>(Please specify course ID & course title, if any)</i>				
Course objectives	- Students can gain fundamental insights into the thermodynamic principles for natural gas processing. - Students can have a clear picture of the basic design principles for the common units in the natural gas processing plant. - Students know how to formulate and solve problems using appropriate calculations for the plant design. - Students can interpret the solutions. - Students can set up a strategy, perform basic design and profitability analysis for natural gas processing plants. - Students are able to apply this knowledge confidently and correctly in industrial areas.				
Course learning outcomes	Upon the successful completion of this course, students will be able to: <table border="1"> <thead> <tr> <th>Competency level¹</th><th>Course learning outcome (CLO)</th></tr> </thead> <tbody> <tr> <td>Knowledge</td><td>CLO1. Be able to identify various reserves, composition, properties, importance of natural gas and gain basic knowledge of natural gas transportation technologies and natural gas processing; Able to gain deep knowledge of all processes in a natural gas processing plant from reserves to customers (raw gas transmission, phase separation, sweetening, dehydration, compression, and transportation); Able to solve problems involving simplified design for natural gas treating sweetening, dehydration and compression units using the appropriate calculations [Evaluating].</td></tr> </tbody> </table>	Competency level ¹	Course learning outcome (CLO)	Knowledge	CLO1. Be able to identify various reserves, composition, properties, importance of natural gas and gain basic knowledge of natural gas transportation technologies and natural gas processing; Able to gain deep knowledge of all processes in a natural gas processing plant from reserves to customers (raw gas transmission, phase separation, sweetening, dehydration, compression, and transportation); Able to solve problems involving simplified design for natural gas treating sweetening, dehydration and compression units using the appropriate calculations [Evaluating].
Competency level ¹	Course learning outcome (CLO)				
Knowledge	CLO1. Be able to identify various reserves, composition, properties, importance of natural gas and gain basic knowledge of natural gas transportation technologies and natural gas processing; Able to gain deep knowledge of all processes in a natural gas processing plant from reserves to customers (raw gas transmission, phase separation, sweetening, dehydration, compression, and transportation); Able to solve problems involving simplified design for natural gas treating sweetening, dehydration and compression units using the appropriate calculations [Evaluating].				

¹ Level of competence according to Bloom's Taxonomy:

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x
Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination
Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x

		CLO2. Able to perform a preliminary unit sizing and design of equipment in natural gas processing facilities; Able to perform basic analysis and design of natural gas processing plants and evaluate the profitability and optimize via case studies [Evaluating].																																																								
	Skill	CLO3. Acquire and apply new knowledge as needed, using appropriate learning strategies [Complex Overt Response].																																																								
	Attitude	CLO4. Be able to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts [Valuing].																																																								
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> <u>Weight</u>: lecture session (2.5 hours) <u>Teaching levels</u>: I (Introduce); T (Teach); U (Utilize) <table><tr><th>No.</th><th>Topic</th><th>Weight</th><th>Level</th></tr><tr><td>1</td><td>Introduction to Natural Gas</td><td>1</td><td>I, T</td></tr><tr><td>2</td><td>Natural gas properties and thermodynamics</td><td>1</td><td>T, U</td></tr><tr><td>3</td><td>Processing Overview</td><td>1</td><td>T, U</td></tr><tr><td>4</td><td>Raw Gas Transmission and Phase Separation</td><td>1</td><td>T</td></tr><tr><td>5</td><td>Natural Gas Sweetening</td><td>1</td><td>T, U</td></tr><tr><td>6</td><td>Natural Gas Dehydration</td><td>1</td><td>T</td></tr><tr><td>7</td><td>Natural Gas Compression</td><td>1</td><td>T, U</td></tr><tr><td>8</td><td>Transportation Systems</td><td>1</td><td>T, U</td></tr><tr><td>9</td><td>Natural Gas Processing Plant Design 1</td><td>1</td><td>I, T</td></tr><tr><td>10</td><td>Natural Gas Processing Plant Design 2</td><td>1</td><td>I, T</td></tr><tr><td>11</td><td>Equipment Design 1</td><td>1</td><td>I, T</td></tr><tr><td>12</td><td>Equipment Design 2</td><td>1</td><td>I, T</td></tr><tr><td>13</td><td>Costing Engineering</td><td>1</td><td>I, T</td></tr></table>		No.	Topic	Weight	Level	1	Introduction to Natural Gas	1	I, T	2	Natural gas properties and thermodynamics	1	T, U	3	Processing Overview	1	T, U	4	Raw Gas Transmission and Phase Separation	1	T	5	Natural Gas Sweetening	1	T, U	6	Natural Gas Dehydration	1	T	7	Natural Gas Compression	1	T, U	8	Transportation Systems	1	T, U	9	Natural Gas Processing Plant Design 1	1	I, T	10	Natural Gas Processing Plant Design 2	1	I, T	11	Equipment Design 1	1	I, T	12	Equipment Design 2	1	I, T	13	Costing Engineering	1	I, T
No.	Topic	Weight	Level																																																							
1	Introduction to Natural Gas	1	I, T																																																							
2	Natural gas properties and thermodynamics	1	T, U																																																							
3	Processing Overview	1	T, U																																																							
4	Raw Gas Transmission and Phase Separation	1	T																																																							
5	Natural Gas Sweetening	1	T, U																																																							
6	Natural Gas Dehydration	1	T																																																							
7	Natural Gas Compression	1	T, U																																																							
8	Transportation Systems	1	T, U																																																							
9	Natural Gas Processing Plant Design 1	1	I, T																																																							
10	Natural Gas Processing Plant Design 2	1	I, T																																																							
11	Equipment Design 1	1	I, T																																																							
12	Equipment Design 2	1	I, T																																																							
13	Costing Engineering	1	I, T																																																							

	14	Profitability Analysis	1	I, T	
Examination forms	☐ Multiple-choice questions ☐ Oral examination ☐ Report ☒ Written examination ☐ Presentation ☐ Others, please specify: ☐ Assignments				
Other requirements	<u>Attendance:</u> 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. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.				
Reading list	I. Textbooks [1] Arthur J. Kidnay, William R. Parrish, Daniel G. McCartney, Fundamentals of Natural Gas Processing, Third Edition, 3rd Edition, CRC Press, 2020. II. References [2] Saeid Mokhatab, William A. Poe and John Y. Mak, Handbook of Natural Gas Transmission and Processing, Elsevier, 3rd Edition, 2015.				

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	5						
	2		5					
	3							
Skills (Level: 1-7)	4							
	5							
	6						5	
Attitudes (Level: 1-5)	7							3
	8							
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	5.0	5.0	0.0	0.0	0.0	5.0	3.0
L,M,H conversion*		H	H				H	M

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Introduction to Natural Gas	1,3		- Lecture - Class discussion	[1].
2.	2	Natural gas properties and thermodynamics	1,2	Homework	- Lecture - Class discussion	[1].
3.	3	Processing Overview		Homework	- Lecture - Class discussion	[1].
4.	4	Raw Gas Transmission and Phase Separation		Homework	- Lecture - Class discussion	[1].
5.	5	Natural Gas Sweetening		Quiz	- Lecture - Class discussion	[1].
6.	6	Natural Gas Dehydration		Homework	- Lecture - Class discussion	[1].

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
7.	7	Natural Gas Compression		Homework	- Lecture - Class discussion	[1].
8.	8	Transportation Systems		Quiz	- Lecture - Class discussion	
9.	9	Midterm				
10.	10	Natural Gas Processing Plant Design 1		Homework	- Lecture - Class discussion	[1].
11.	11	Natural Gas Processing Plant Design 2		Homework	- Lecture - Class discussion	[1].
12.	12	Equipment Design 1		Homework	- Lecture - Class discussion	[1].
13.	13	Equipment Design 2		Quiz	- Lecture - Class discussion	[1].
14.	14	Costing Engineering		Homework	- Lecture - Class discussion	[1].
15.	15	Profitability Analysis		Quiz	- Lecture - Class discussion	[1].
16.	16	Project Presentation			- Class discussion	
17.	17	Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
In-class exercises/quizzes/ Homework (10%)	HW, Quiz 60%Pass	HW, Quiz 60%Pass		HW, Quiz 60%Pass
Group presentation (20%)	Group presentation 50%Pass	Group presentation 50%Pass	Group presentation 50%Pass	

Assessment Type	CLO1	CLO2	CLO3	CLO4
Midterm exam (30%)		Q3 50%Pass	Q1, Q2 50%Pass	
Final exam (40%)	Part I 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): No

6. Revision Date: May 20, 2023

Ho Chi Minh City, 20/5/2023

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	An ability to identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	An ability to communicate (in English) effectively with a range of audiences
4	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Bioinorganic Chemistry

(Hóa sinh vô cơ)

Course Code: CHE3241IU

1. General information

Course designation	This course will take the students to the wonderland laying at the interface of inorganic chemistry and biochemistry. It first introduces the basic concepts of biochemistry an inorganic chemistry, which will serve as the basis for the extensive discussions on the diverse chemistry of metals in biology. As bioinorganic chemistry is a highly interdisciplinary field, this course cannot cover all of its aspects. This course focuses on the common themes found in the field. Some important systems and recent advances with potential applications will be highlighted.	
Teaching schedule	☐ Year 1 ☐ Year 2 ☐ Year 3 ☒ Year 4 ☐ Year 5 ☒ Semester 1 ☐ Semester 2 ☐ Summer	
Person In-Charge		
Language	English	
Relation to curriculum	☐ General ☐ Fundamental ☒ Specialization ☐ Project/Internship/Thesis	☒ Compulsory ☐ Elective
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify:	

Workload			Lecture	Lab	Project	Internship	Thesis								
		<i>Credit</i>	3												
	Contact hours	37.5	37.5	0	0	0	0								
	Self-Study hours	90	90	0	0	0	0								
	Total workload	127.5	127.5	0	0	0	0								
Credit points	3														
Requirements for taking the course	☒ None ☐ Prerequisite course: <i>(Please specify course ID & course title, if any)</i> ☐ Parallel course: <i>(Please specify course ID & course title, if any)</i> ☐ Previous course: <i>(Please specify course ID & course title, if any)</i>														
Course objectives	- This course aim to provide the student with a deep understanding and thus appreciation for bioinorganic chemistry. - The students will acquire updated knowledge and techniques required to design studies of any bioinorganic chemistry systems. - The students will have a set of skills to understand, evaluate, summarize, and effectively present scientific literature.														
Course learning outcomes	Upon the successful completion of this course, students will be able to: <table border="1"> <thead> <tr> <th>Competency level</th> <th>Course learning outcome (CLO)</th> </tr> </thead> <tbody> <tr> <td>Knowledge</td> <td> CLO1. Understand the basic concept of biochemistry and inorganic chemistry CLO2. Understand the roles of metals in biology CLO3. Understand biologically important hydrolytic chemistry exerted by metalloenzymes CLO4. Understand electron transport in proteins CLO5. Understand biologically important oxidative chemistry exerted by metalloenzymes </td> </tr> <tr> <td>Skill</td> <td>CLO6. Relate the principle of bioinorganic chemistry to practical applications</td> </tr> <tr> <td>Attitude</td> <td></td> </tr> </tbody> </table>							Competency level	Course learning outcome (CLO)	Knowledge	CLO1. Understand the basic concept of biochemistry and inorganic chemistry CLO2. Understand the roles of metals in biology CLO3. Understand biologically important hydrolytic chemistry exerted by metalloenzymes CLO4. Understand electron transport in proteins CLO5. Understand biologically important oxidative chemistry exerted by metalloenzymes	Skill	CLO6. Relate the principle of bioinorganic chemistry to practical applications	Attitude	
Competency level	Course learning outcome (CLO)														
Knowledge	CLO1. Understand the basic concept of biochemistry and inorganic chemistry CLO2. Understand the roles of metals in biology CLO3. Understand biologically important hydrolytic chemistry exerted by metalloenzymes CLO4. Understand electron transport in proteins CLO5. Understand biologically important oxidative chemistry exerted by metalloenzymes														
Skill	CLO6. Relate the principle of bioinorganic chemistry to practical applications														
Attitude															
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> Weight: lecture session (2.5 hours)														

	Teaching levels: I (Introduce); T (Teach); U (Utilize)			
	No.	Topic	Weight	Level
	1	Basic Concepts of Biochemistry Basic Concepts of Inorganic Chemistry		
	2	Metals in biology		
	3	Hydrolytic Chemistry		
	4	Electron transfer in proteins		
	5	Chemistry of O ₂		
	6	Other special enzymes		
	7	Model complexes and Bioinspired catalysts		
	8	Metals in Medicine		
	9	Final project presentations		
	10			
Examination forms	☐ Multiple-choice questions ☐ Oral examination ☐ Report ☒ Written examination ☐ Presentation ☐ Others, please specify: ☐ Assignments			
Other requirements	<u>Attendance:</u> 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. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.			
Reading list	- Ivano Bertini, Harry B. Gray, Stephen J. Lippard, and Joan Selverstone Valentine; Biological Inorganic Chemistry, University Science Books, 2007 - Stephen J. Lippard and Jeremy M. Berg, Principles of Bioinorganic Chemistry, University Science Books, 1994			

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-7) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	3						
	2		3					
	3	2						
Skills (Level: 1-7)	4			3				
	5			3				
Attitudes (Level: 1-5)	6							3
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	2.5	3.0	3.0	0.0	0.0	0.0	3.0
L,M,H conversion*		L	M	M				M

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

Week	Content	Learning outcome	Teaching & learning activity	Assessment
1	Basic Concepts of Biochemistry: a. Building blocks of biology: Amino acids	CLO1	- Lecture - Class discussion	
2 -3	Basic Concepts of Inorganic Chemistry: b. Metal-ligand interaction c. Ligand field theory d. Redox properties e. Spectroscopy: Optical, CD, Mössbauer, EPR, XAS	CLO 1	- Lecture - Class discussion	Homework
4-5	Metals in biology:	CLO 2	- Lecture	-Homework

	a. Metal-protein interactions b. Metal based cofactors in biology c. Transport and storage of metal ions in biology		- Student presentation - Class discussion	- Presentation
6-7	Hydrolytic Chemistry: a. Carbonic anhydrase b. Urease c. Acotinase	CLO 3	- Lecture - Group presentation - Class discussion	-Homework - Presentation
	Midterm 1			
8-9	Electron transfer in proteins a. Basic concepts b. Fe-S clusters c. Copper proteins d. Photosynthesis and respiration	CLO 4	- Lecture - Group presentation - Class discussion	-Homework - Presentation -Quiz 2
10-11	Chemistry of O ₂ a. Basic concepts b. O ₂ transport c. C-H bond cleaving enzymes: d. Recalcitrant polymer degrading oxidative enzymes	CLO 5	- Lecture - Group presentation - Class discussion	-Homework - Presentation
	Midterm 2			
12	Other special enzymes a. Hydrogenase b. Nitrogenase c. Decarbonylase	CLO 5	- Lecture - Group presentation - Class discussion	-Homework - Presentation
13	Model complexes and Bioinspired catalysts	CLO 6	- Lecture - Group presentation - Class discussion	-Quiz - Presentation
14	Metals in Medicine:	CLO 6	- Lecture	-Quiz

	a. Anti-cancer agents b. Contrast agents		- Group presentation - Class discussion	- Presentation
15	Final project presentations	CLO 1- CLO 6	- Group Presentation - Class discussion	- Presentation
	Final exam			

4. 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.

5. Date revised: May 20, 20223

Ho Chi Minh City, 20/5/2023

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	An ability to identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	An ability to communicate (in English) effectively with a range of audiences
4	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

RECORD OF REVISIONS

[illegible]



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Medicinal chemistry
(Hóa Dược)

Course Code: CHE3331IU

1. General information

Course designation	This course will cover the principles of drug actions and the design and development of potential therapeutics. The action and behavior of pharmaceutical compounds and the relationship between their structure and their chemical and therapeutic properties, and the chemical considerations in drug design will also be explored. Methods of drug discovery will be introduced including the development of drugs from natural products, computer modeling and rational drug design.	
Teaching schedule	☐ Year 1 ☐ Year 2 ☐ Year 3 ☒ Year 4 ☐ Year 5 ☒ Semester 1 ☐ Semester 2 ☐ Summer	
Person In-Charge	Dr. Nguyen Thao Trang, nttrang@hcmiu.edu.vn Template: (Name in Vietnamese order), (Email)	
Language	English	
Relation to curriculum	☐ General ☐ Fundamental ☒ Specialization ☐ Project/Internship/Thesis	☐ Compulsory ☒ Elective
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify:	

Workload			Lecture	Lab	Project	Internship	Thesis
		Credit	3				
	Contact hours	37.5	37.5	0	0	0	0
	Self-Study hours	90	90	0	0	0	0
	Total workload	127.5	127.5	0	0	0	0
Credit points	3						
Requirements for taking the course	☐ None ☐ Prerequisite course: (Please specify course ID & course title, if any) ☐ Parallel course: ☒ Previous course: Biochemistry CHE1104IU						
Course objectives	The students will be provided with fundamental knowledge of medicinal chemistry which allows to gain insights into how to choose a lead compound to be a medicinal drug, study its mechanism of action, identify the drug targets, evaluate its medicinal and toxic effects, synthesize better analogues, and study the pathways for metabolism and elimination from the body.						
Course learning outcomes	Upon the successful completion of this course, students will be able to:						
	Competency level	Course learning outcome (CLO)					
	Knowledge	CLO1. Understand and correlate the chemical nature with biochemical behavior of common classes of drug targets and modes of drug action; understand the concepts of pharmacodynamics, pharmacokinetics, and drug metabolism and how these processes impact drug activity within the body; and describe the process of drug discovery from initial compound identification and optimization. [4]					
	Skill	CLO2. Be able to interpret the measure the activity of enzymes and receptor; predict and alter the metabolism and solubility of a molecule by structural changes; design molecules with desired biological activity for certain properties; use various approaches for optimizing a molecule’s structure into a safe and effective drug. [4]					
	Attitude	CLO3. Demonstrate reasoned decisions which reflect ethical standards, and act in accordance with those decisions.[3]					
Content	The description of the contents should clearly indicate the weighting of the content and the level. Weight: lecture session (2.5 hours) Teaching levels: I (Introduce); T (Teach); U (Utilize)						

	No.	Topic	Weight	Level
	1	Overview of Drugs and drug targets	1	I, T
	2	Structures and functions of important drug targets	6	I, T
	4	Drug pharmacokinetics	2	I, T
	5	Drug discovery	1	I, T
	6	Drug design	4	I, T, U
	7	Computer tools in drug design	1	I, T, U
Examination forms	☒ Multiple-choice questions ☐ Oral examination ☐ Report ☒ Written examination ☐ Presentation ☐ Others, please specify: ☒ Assignments			
Other requirements	<u>Attendance:</u> 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. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.			
Reading list	I. Textbooks [1] Graham L. Patrick, In Introduction to Medicinal Chemistry, 5th edition, 2013, Oxford University Press. II. References			

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-3) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	4						
Skills (Level: 1-7)	2			4	4		4	
Attitudes (Level: 1-5)	3							3
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	4.0	0.0	4.0	4.0	0.0	4.0	3.0
L,M,H conversion*		H		H	H		H	M

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Overview of Drugs and drug targets	1, 3	Quiz	- Lecture - Class discussion	
2.	2, 3	Receptor: structure and function Receptors and signal transduction	1, 2	Quiz	- Lecture - Class discussion	
3.	4	Nucleic acid: structure and function	1, 2	Quiz	- Lecture - Class discussion	
4.	5, 6	Enzyme and receptors as drug targets	1,2	Quiz, Assignment	- Lecture - Class discussion	
5.	7	Nucleic acid as drug targets Miscellaneous drug targets	1,2	Quiz, Assignment	- Lecture - Class discussion	
6.	8	Drug pharmacokinetics: absorption, distribution, metabolism, excretion, administration and dosing	1,2	Quiz	- Lecture - Class discussion	
7.	9-10	Midterm				
8.	11, 12	Steps in Drug discovery: choosing a disease, choosing a drug target, identifying a bioassay, finding a lead compound	1,2, 3	Quiz	- Lecture - Class discussion	

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
9.	13, 14	Drug design: - structure and activity relationship. - optimizing interactions with the targets		Quiz Assignment	- Lecture - Class discussion	
10	15	Drug design: optimizing access to the target.	1,2, 3	Quiz Assignment	- Lecture - Class discussion	
11	16	Introduction to Computer tools in drug design	1,2, 3	Quiz	- Lecture - Class discussion	
12	17	Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3
Assignment, Quiz (30%)	Quiz Assignment 50%Pass	Quiz Assignment 50%Pass	Quiz, Assignment 50 %Pass
Midterm exam (30%)	Quiz Q1 50%Pass	Quiz Q2 50%Pass	
Final exam (40%)	Quiz Q1 50 % Pass	Quiz Q2 50 % Pass	

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

5. Rubrics (optional): No

6. Revision Date: May 20, 2023

Ho Chi Minh City, 20/5/2023

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Treatment Plant Operation

(Vận hành nhà máy xử lý)

Course Code: CHE3431IU

1. General information

Course designation	This course provides the fundamentals for the cost-effective, safe, and lawful operation of wastewater or sanitation treatment systems. This course provides skills in experimental set-up used for operation units of wastewater treatment plants. It also provides the basics of environmental legislation and regulations, risk management, and HSE.																																								
Teaching schedule	☐ Year 1 ☐ Year 2 ☐ Year 3 ☒ Year 4 ☐ Year 5 ☒ Semester 1 ☐ Semester 2 ☐ Summer																																								
Person In-Charge	Associate Prof. Dr. Tran Tien Khoi, ttkhoi@hcmiu.edu.vn																																								
Language	English																																								
Relation to curriculum	☐ General ☐ Fundamental ☒ Specialization ☐ Project/Internship/Thesis			☐ Compulsory ☒ Elective																																					
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify:																																								
Workload	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th></th><th></th><th>Lecture</th><th>Lab</th><th>Project</th><th>Internship</th><th>Thesis</th></tr> </thead> <tbody> <tr> <td></td><td><i>Credit</i></td><td>3</td><td></td><td></td><td></td><td></td></tr> <tr> <td>Contact hours</td><td>37.5</td><td>37.5</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td>Self-Study hours</td><td>90</td><td>90</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr> <td>Total workload</td><td>127.5</td><td>127.5</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> </tbody> </table>								Lecture	Lab	Project	Internship	Thesis		<i>Credit</i>	3					Contact hours	37.5	37.5	0	0	0	0	Self-Study hours	90	90	0	0	0	0	Total workload	127.5	127.5	0	0	0	0
		Lecture	Lab	Project	Internship	Thesis																																			
	<i>Credit</i>	3																																							
Contact hours	37.5	37.5	0	0	0	0																																			
Self-Study hours	90	90	0	0	0	0																																			
Total workload	127.5	127.5	0	0	0	0																																			

Credit points	3						
Requirements for taking the course	☒ None ☐ Prerequisite course: <i>(Please specify course ID & course title, if any)</i> ☐ Parallel course: <i>(Please specify course ID & course title, if any)</i> ☐ Previous course: <i>(Please specify course ID & course title, if any)</i>						
Course objectives	This course provides student knowledge of wastewater treatment systems, the legislation and regulations for the treatment, disposal, and management; application of knowledge for operation, analyzing factors, detecting technical problems.						
Course learning outcomes	Upon the successful completion of this course, students will be able to: <table border="1"> <thead> <tr> <th>Competency level¹</th><th>Course learning outcome (CLO)</th></tr> </thead> <tbody> <tr> <td>Knowledge</td><td> CLO1. Understand the wastewater treatment systems; List the fundamentals of the operational units that are part of the wastewater treatment plants; Analyze and estimate factors relating to planning of wastewater management system; Detect and assess technical problems in wastewater treatment plants operation [Analyzing]. CLO2. Apply the legislation and regulations of wastewater treatment, disposal and management; Apply knowledge of physico-chemical processes and biological processes operation of wastewater treatment plants [Evaluating]. </td></tr> <tr> <td>Skill</td><td>CLO3. Manipulate and operate wastewater treatment systems [Complex Overt Response].</td></tr> </tbody> </table>	Competency level ¹	Course learning outcome (CLO)	Knowledge	CLO1. Understand the wastewater treatment systems; List the fundamentals of the operational units that are part of the wastewater treatment plants; Analyze and estimate factors relating to planning of wastewater management system; Detect and assess technical problems in wastewater treatment plants operation [Analyzing]. CLO2. Apply the legislation and regulations of wastewater treatment, disposal and management; Apply knowledge of physico-chemical processes and biological processes operation of wastewater treatment plants [Evaluating].	Skill	CLO3. Manipulate and operate wastewater treatment systems [Complex Overt Response].
Competency level ¹	Course learning outcome (CLO)						
Knowledge	CLO1. Understand the wastewater treatment systems; List the fundamentals of the operational units that are part of the wastewater treatment plants; Analyze and estimate factors relating to planning of wastewater management system; Detect and assess technical problems in wastewater treatment plants operation [Analyzing]. CLO2. Apply the legislation and regulations of wastewater treatment, disposal and management; Apply knowledge of physico-chemical processes and biological processes operation of wastewater treatment plants [Evaluating].						
Skill	CLO3. Manipulate and operate wastewater treatment systems [Complex Overt Response].						

¹ Level of competence according to Bloom's Taxonomy:

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x
Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination
Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x

		CLO4. Set up targets and requirements of wastewater treatment systems [Complex Overt Response].																									
	Attitude	CLO5. Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts [Organization].																									
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> <u>Weight:</u> lecture session (2.5 hours) <u>Teaching levels:</u> I (Introduce); T (Teach); U (Utilize) <table><tr><th>No.</th><th>Topic</th><th>Weight</th><th>Level</th></tr><tr><td>1</td><td>Lecture 1. Overview</td><td>2</td><td>I, T</td></tr><tr><td>2</td><td>Lecture2. Wastewater Treatment Plant Management</td><td>3</td><td>T, U</td></tr><tr><td>3</td><td>Lecture 3. Management and Control of Emission from the Plant</td><td>3</td><td>T, U</td></tr><tr><td>4</td><td>Lecture 4. Operation</td><td>4</td><td>T,U</td></tr><tr><td>5</td><td>Lecture 5. Optimizing system operation</td><td>3</td><td>T, U</td></tr></table>			No.	Topic	Weight	Level	1	Lecture 1. Overview	2	I, T	2	Lecture2. Wastewater Treatment Plant Management	3	T, U	3	Lecture 3. Management and Control of Emission from the Plant	3	T, U	4	Lecture 4. Operation	4	T,U	5	Lecture 5. Optimizing system operation	3	T, U
No.	Topic	Weight	Level																								
1	Lecture 1. Overview	2	I, T																								
2	Lecture2. Wastewater Treatment Plant Management	3	T, U																								
3	Lecture 3. Management and Control of Emission from the Plant	3	T, U																								
4	Lecture 4. Operation	4	T,U																								
5	Lecture 5. Optimizing system operation	3	T, U																								
Examination forms	☒ Multiple-choice questions ☐ Report ☐ Presentation ☐ Assignments ☐ Oral examination ☐ Written examination ☒ Others, please specify: Short answer questions																										
Other requirements	<u>Attendance:</u> 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. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.																										
Reading list	I. Textbooks [1]. T. George, L.B. Franklin, H.D. Stensel, <i>Wastewater Engineering: Treatment and Resource Recovery</i>, 4th edition, Metcalf and Eddi Inc, 2003 II. References																										

	[2]. Wesley Eckenfelder, <i>Industrial Water Pollution Control</i>, 3rd edition, McGraw-Hill Education, 2000 [3]. Mecalfe and Eddy, <i>Wastewater Engineering, Treatment, Disposal and Resource Recovery</i>, 5th edition, McGraw-Hill Education, 2013

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-5) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	4						
	2		5					
	3							
Skills (Level: 1-7)	4				5			
	5					5		
	6							
Attitudes (Level: 1-5)	7							4
	8							
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	4.0	5.0	0.0	5.0	5.0	0.0	4.0
L,M,H conversion*		H	H		H	H		H

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Lecture 1. Overview 1.1. Legislations and Regulations 1.2. Technical Standards Risk Management	1,2,5		Learning in class: listen/take note, ask questions Learning at home: reading	[1], [2], [3]
2.	2	Lecture 1. Overview 1.3. Safety Regulations Important factor in management and operation of wastewater treatment system	1,2,5	Homework	Learning in class: listen/take note, ask questions Learning at home: reading	[1], [2], [3]

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
3.	3	Lecture2. Wastewater Treatment Plant Management 2.1. Management Concepts, Content and Objectives 2.2. Team Building 4Organization and Structure of M5 anagement systems	1,2	Homework	Learning in class: listen/take note, ask questions Learning at home: reading	[1], [2], [3]
4.	4	Lecture2. Wastewater Treatment Plant Management 2.3. Operation Instructions Forms, Documents and Records	1,2	Quiz	- Group discussion -Class discussion	[1], [2], [3]
5.	5	Lecture2. Wastewater Treatment Plant Management 2.4. Training and Maintenance plan 2.5. HSE Operation Cost Estimation	1,2,5	Homework	Learning in class: listen/take note, ask questions Learning at home: reading	[1], [2], [3]
6.	6	Lecture 3. Management and Control of Emission from the Plant 3.1. Air and Odor Sources Sludge	1	Homework	Learning in class: listen/take note, ask questions Learning at home: reading	[1], [2], [3]
7.	7	Lecture 3. Management and Control of Emission from the Plant 3.2. Solid Wastes Hazardous Wastes	1,5	Quiz	Learning in class: listen/take note, ask questions Learning at home: reading	[1], [2], [3]
8.	8	Lecture 3. Management and Control of Emission from the Plant Sources Monitoring and Control	1	Homework	Learning in class: listen/take note, ask questions Learning at home: reading	[1], [2], [3]
9.	9	Midterm				
10.	10	Lecture 4. Operation 4.1. Operation Process Equipment and Instruments – PID Drawing	1,2,3 ,4	Homework	Learning in class: listen/take note, ask questions Learning at home: reading	[1], [2], [3]
11.	11	Lecture 4. Operation 4.2. Pumps and Piping Systems Chemical Handling Systems	1,2,3 ,4	Homework	Learning in class: listen/take note, ask questions Learning at home: reading	[1], [2], [3]
12.	12	Lecture 4. Operation 4.3. Aeration Systems Sludge Handling Systems	1,2,3 ,4	Quiz	Learning in class: listen/take note, ask questions Learning at home: reading	[1], [2], [3]

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
13.	13	Lecture 4. Operation 4.6. Sludge Handling Systems Electrical Control Systems	1,2,3 ,4	Homework	Learning in class: listen/take note, ask questions Learning at home: reading	[1], [2], [3]
14.	14	Lecture 5. Optimizing system operation 5.1. Operation Diary Laboratory Management	1,2	Homework	Learning in class: listen/take note, ask questions Learning at home: reading	[1], [2], [3]
15.	15	Lecture 5. Optimizing system operation 5.2. Energy Saving System Failure	1,2	Homework	Learning in class: listen/take note, ask questions Learning at home: reading	[1], [2], [3]
16.	16	Lecture 5. Optimizing system operation 5.3. Lost and Prevention Biological Process Monitoring	1,2	Quiz	Learning in class: listen/take note, ask questions Learning at home: reading	[1], [2], [3]
17.	17	Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
In-class exercises/quizzes (10%)	Qz 60%Pass	Qz 60%Pass		Qz 60%Pass
Homework exercises (20%)	HW2 50%Pass		HW1, HW3, HW4 50%Pass	
Midterm exam (30%)		Q3 50%Pass	Q1, Q2 50%Pass	
Final exam (40%)	Part I 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): No

6. Revision Date: May 20, 2023

Ho Chi Minh City, 20/5/2023

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	An ability to identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	An ability to communicate (in English) effectively with a range of audiences
4	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Corrosion Chemistry
(Hóa học ăn mòn)

Course Code: CHE3251IU

1. General information

Course designation	This course will introduce students with concepts of corrosion. The mechanism of corrosion including active corrosion, galvanic corrosion, passivity and localized corrosion and electrochemical reduction reactions and environmentally assisted cracking will be covered. The methods of corrosion mitigation including cathodic protection, coatings, inhibitors and passivators as well as the influence of material's chemical composition and microstructure on corrosion behavior will also be discussed.	
Teaching schedule	☐ Year 1 ☐ Year 2 ☐ Year 3 ☒ Year 4 ☐ Year 5 ☒ Semester 1 ☐ Semester 2 ☐ Summer	
Person In-Charge		
Language	English	
Relation to curriculum	☐ General ☐ Fundamental ☒ Specialization ☐ Project/Internship/Thesis	☐ Compulsory ☒ Elective
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify:	

Workload			Lecture	Lab	Project	Internship	Thesis
		Credit	3				
	Contact hours	37.5	37.5	0	0	0	0
	Self-Study hours	90	90	0	0	0	0
	Total workload	127.5	127.5	0	0	0	0
Credit points	3						
Requirements for taking the course	☐ None ☐ Prerequisite course: <i>(Please specify course ID & course title, if any)</i> ☐ Parallel course: <i>(Please specify course ID & course title, if any)</i> ☒ Previous course: Physical Chemistry 1 (CHE1081IU); Physical Chemistry 2 (CHE1043IU); Inorganic Chemistry (CHE2103IU); Organic Chemistry 1 (CHE1081IU)						
Course objectives	This course introduces to students the following special topics, including: aspects of electrochemistry and materials science relevant to corrosion phenomena; methods for predicting, measuring and analyzing corrosion performance of materials; and practices for the prevention and remediation of corrosion.						
Course learning outcomes	Upon the successful completion of this course, students will be able to:						
	Competency level ¹	Course learning outcome (CLO)					
	Knowledge	CLO1. Identify the origin of the difference in electrical potential across an interface, the relationship between the rate of electrochemical reaction and potential drop across interfaces. [Remember] CLO2. Evaluate the cause and mechanism of various types of corrosion. [Evaluate] CLO3. Identify materials that exhibit adequate corrosion resistance in a particular environment. [Remember]					
	Skill						
	Attitude	CLO4. Discuss the influence of a material's composition and microstructure on its corrosion performance. [Responding to phenomena] CLO5. Propose economically viable remedial actions that eliminates or reduces corrosion. [Valuing]					
¹ Level of competence according to Bloom's Taxonomy:							
	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x
Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination

Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i>						
	<u>Weight:</u> lecture session (2.5 hours)						
	<u>Teaching levels:</u> I (Introduce); T (Teach); U (Utilize)						
	No.	Topic	Weight	Level			
	1	Definition and importance of corrosion	1	I, T			
	2	Electrochemical mechanisms	2	T, U			
	3	Thermodynamics: Corrosion tendency and electrode potentials	1	T, U			
	4	Thermodynamics: Pourbaix diagrams. Construction and use of Pourbaix diagrams	2	T			
	5	Corrosion inhibitors	2	T, U			
	6	Corrosion inhibitors	2	T			
	7	Corrosion protection by coatings	1	T, U			
	8	Theories of passivity	1	T, U			
	9	Influence of microstructure on corrosion	0.5	I, T			
	10	Corrosion of nanostructures	0.5	I, T			
	11	Corrosion in non-aqueous electrolytes	0.5	I, T			
12	Hydrogen assisted cracking	0.5	I, T				
13	Atmospheric corrosion	0.5	I, T				
Examination forms	☐ Multiple-choice questions ☐ Report ☐ Presentation ☐ Assignments ☐ Oral examination ☒ Written examination ☐ Others, please specify:						
Other requirements	<u>Attendance:</u> 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. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.						
Reading list	I. Textbooks 1. R. Winston Revie and Herbert H. Uhlig, Corrosion and Corrosion Control - An Introduction to Corrosion Science and Engineering, Wiley-Interscience (2008). 2. D Jones, Principles and Prevention of Corrosion, Macmillan Publications New York, 1992. II. References 1. J J Meketta, Cathodic Protection Theory and Practice, Marcel Dekker Publication, New York, 1993.						

	2. S N Banerjee, An Introduction to Corrosion and Corrosion Inhibition, Oxonian Press Ltd., New Delhi.

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-5) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	1						
	2	5						
	3	1						
Skills (Level: 1-7)								
Attitudes (Level: 1-5)	4							2
	5							3
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	2.3	0.0	0.0	0.0	0.0	0.0	2.5
L,M,H conversion*		L						L

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Definition and importance of corrosion		HW	Lecture	
2.	2&3	Electrochemical mechanisms		HW	Lecture	
3.	4	Thermodynamics: Corrosion tendency and electrode potentials		HW	Lecture	
4.	5	Thermodynamics: Pourbaix diagrams. Construction and use of Pourbaix diagrams		HW	Lecture	
5.	6	Corrosion inhibitors		HW	Lecture	
6.	7	Corrosion inhibitors				
7.	8	Corrosion protection by coatings				
8.	9-10	Midterm				
9.	11	Theories of passivity		HW	Lecture	
10.	12	Influence of microstructure on corrosion		HW	Lecture	
11.	13	Corrosion of nanostructures		HW	Lecture	
12.	14	Corrosion in non-aqueous electrolytes		HW	Lecture	
13.	15	Hydrogen assisted cracking		HW	Lecture	
14.	16&17	Atmospheric corrosion		HW	Lecture	
15.	18	Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4	CLO5
Homework/Quiz (30%)	>50%pass		>50%pass		
Midterm exam (30%)	>50%pass	>50%pass			
Final exam (40%)			>50%pass	>50%pass	

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

5. Rubrics (optional): No

6. Revision Date: May 20, 2023

Ho Chi Minh City, 20/5/2023

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Project 1

(Đồ án 1)

Course Code: CHE0042IU

1. General information

Course designation	Lectures include an introduction to scientific research, research planning and proposal development, experimental design and hypothesis testing, publication procedure with focus on thesis preparation. Students are requested to conduct a course project that is used to evaluate how theory is applied in practice as well as to develop inter-personal skills.																																								
Teaching schedule	☐ Year 1 ☐ Year 2 ☐ Year 3 ☒ Year 4 ☐ Year 5																																								
	☒ Semester 1 ☐ Semester 2 ☐ Summer																																								
Person In-Charge																																									
Language	English																																								
Relation to curriculum	☐ General ☐ Fundamental ☐ Specialization ☒ Project/Internship/Thesis			☒ Compulsory ☐ Elective																																					
Teaching methods	☐ Lecture ☐ Lesson ☒ Project ☐ Seminar Others, please specify:																																								
Workload	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th></th><th></th><th>Lecture</th><th>Lab</th><th>Project</th><th>Internship</th><th>Thesis</th></tr> </thead> <tbody> <tr> <td></td><td><i>Credit</i></td><td></td><td></td><td>1</td><td></td><td></td></tr> <tr> <td>Contact hours</td><td>37.5</td><td>0</td><td>0</td><td>37.5</td><td>0</td><td>0</td></tr> <tr> <td>Self-Study hours</td><td>30</td><td>0</td><td>0</td><td>30</td><td>0</td><td>0</td></tr> <tr> <td>Total workload</td><td>67.5</td><td>0</td><td>0</td><td>67.5</td><td>0</td><td>0</td></tr> </tbody> </table>								Lecture	Lab	Project	Internship	Thesis		<i>Credit</i>			1			Contact hours	37.5	0	0	37.5	0	0	Self-Study hours	30	0	0	30	0	0	Total workload	67.5	0	0	67.5	0	0
		Lecture	Lab	Project	Internship	Thesis																																			
	<i>Credit</i>			1																																					
Contact hours	37.5	0	0	37.5	0	0																																			
Self-Study hours	30	0	0	30	0	0																																			
Total workload	67.5	0	0	67.5	0	0																																			

Credit points	1																								
Requirements for taking the course	☒ None ☐ Prerequisite course: <i>(Please specify course ID & course title, if any)</i> ☐ Parallel course: <i>(Please specify course ID & course title, if any)</i> ☐ Previous course: <i>(Please specify course ID & course title, if any)</i>																								
Course objectives	The Research Methodology course is designed to provide participants with a comprehensive understanding of the fundamental principles, techniques, and processes involved in conducting rigorous and effective research across various disciplines. This course aims to equip students with the skills and knowledge necessary to design, execute, analyze, and interpret research studies in an ethical and methodologically sound manner.																								
Course learning outcomes	Upon the successful completion of this course, students will be able to: <table border="1"> <thead> <tr> <th>Competency level</th><th>Course learning outcome (CLO)</th></tr> </thead> <tbody> <tr> <td>Knowledge</td><td> CLO1. Demonstrate an understanding of the scientific research process and how each step interlinks with the other, the requirements for a decent research. CLO2. Demonstrate a basic knowledge of used methodological tools in empirical research, including surveys, interviews, content analysis, case selection and comparison, and basic statistical methods </td></tr> <tr> <td>Skill</td><td> CLO3. Develop the research proposal CLO4. Develop the skills of teamworks and problem-solving </td></tr> <tr> <td>Attitude</td><td></td></tr> </tbody> </table>	Competency level	Course learning outcome (CLO)	Knowledge	CLO1. Demonstrate an understanding of the scientific research process and how each step interlinks with the other, the requirements for a decent research. CLO2. Demonstrate a basic knowledge of used methodological tools in empirical research, including surveys, interviews, content analysis, case selection and comparison, and basic statistical methods	Skill	CLO3. Develop the research proposal CLO4. Develop the skills of teamworks and problem-solving	Attitude																	
Competency level	Course learning outcome (CLO)																								
Knowledge	CLO1. Demonstrate an understanding of the scientific research process and how each step interlinks with the other, the requirements for a decent research. CLO2. Demonstrate a basic knowledge of used methodological tools in empirical research, including surveys, interviews, content analysis, case selection and comparison, and basic statistical methods																								
Skill	CLO3. Develop the research proposal CLO4. Develop the skills of teamworks and problem-solving																								
Attitude																									
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> Weight: lecture session (2.5 hours) Teaching levels: I (Introduce); T (Teach); U (Utilize) <table border="1"> <thead> <tr> <th>No.</th><th>Topic</th><th>Weight</th><th>Level</th></tr> </thead> <tbody> <tr> <td>1</td><td>Lecture 1: Introduction</td><td>1</td><td>I, T</td></tr> <tr> <td>2</td><td>Lecture 2: Planning a research: problem identification & proposal development</td><td>2</td><td>T, U</td></tr> <tr> <td>3</td><td>Lecture 3: Testing hypothesis</td><td>1</td><td>T, U</td></tr> <tr> <td>4</td><td>Lecture 4: Experimental design</td><td>2</td><td>T</td></tr> <tr> <td>5</td><td>Lecture 5: Writing up (publication process, data presentation and thesis preparation)</td><td>2</td><td>T, U</td></tr> </tbody> </table>	No.	Topic	Weight	Level	1	Lecture 1: Introduction	1	I, T	2	Lecture 2: Planning a research: problem identification & proposal development	2	T, U	3	Lecture 3: Testing hypothesis	1	T, U	4	Lecture 4: Experimental design	2	T	5	Lecture 5: Writing up (publication process, data presentation and thesis preparation)	2	T, U
No.	Topic	Weight	Level																						
1	Lecture 1: Introduction	1	I, T																						
2	Lecture 2: Planning a research: problem identification & proposal development	2	T, U																						
3	Lecture 3: Testing hypothesis	1	T, U																						
4	Lecture 4: Experimental design	2	T																						
5	Lecture 5: Writing up (publication process, data presentation and thesis preparation)	2	T, U																						

	6	Project 1. Project assignment and discussion	2	T
	7	Project 2. Project plan development	1	T, U
	8	Project 3. Review of pilot experiment	1	T, U
	9	Project 4. Revision of project plan for final implementation	0.5	I, T
	10	Project 5. Presentation of project outcomes	0.5	I, T
Examination forms	☐ Multiple-choice questions ☐ Oral examination ☒ Report ☐ Written examination ☐ Presentation ☐ Others, please specify: ☐ Assignments			
Other requirements	<u>Attendance:</u> 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. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.			
Reading list	- Day, R.A. (2011) How to write and publish a scientific paper. Cambridge University Press, USA - Linfield C. Brown, Paul Mac Berthouex (2002) Statistics for Environmental Engineers, Lewis publisher, USA. - John Townend (2003) Practical statistics for environmental and biological scientists. John Wiley & Sons, England			

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-6) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	3						
	2		2					
	3	3						
Skills (Level: 1-7)	4			4				
	5			2				
Attitudes (Level: 1-5)	6							4
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	3.0	2.0	3.0	0.0	0.0	0.0	4.0
L,M,H conversion*		M	L	M				H

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Project 1. Project assignment and discussion	1		Introduction & Discussion	
2.	2	Project 2. Project plan development			Planning & Preparation	
3.	3	Project 3. Review of pilot experiment	1, 5		Pilot experiment	
4.	4	Project 4. Revision of project plan for final implementation	2		Revision of student project plan	
5.	5	Project 5. Presentation of project outcomes	1,3		Individual Presentation	
6.	6	Final exam				

4. 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.

5. Date revised: May 20, 20223

Ho Chi Minh City, 20/5/2023

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	An ability to identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	An ability to communicate (in English) effectively with a range of audiences
4	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

RECORD OF REVISIONS

[illegible]



**VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY**
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Project 2

(Đồ án 2)

Course Code: CHE0052IU

1. General information

Course designation	This course belongs to a series of two courses offered for the students in their 3rd year and the 1st semester of the 4th year. The course is designed to allow the students to be exposed to a wide variety of research areas in Chemical Engineering through participation in laboratory group. The students will learn to devise hypotheses, design experiments that test their hypotheses, record their data in laboratory notebooks, critically analyze the results of their analyses, and present their findings to others.	
Teaching schedule	☐ Year 1 ☐ Year 2 ☐ Year 3 ☒ Year 4 ☐ Year 5 ☒ Semester 1 ☐ Semester 2 ☐ Summer	
Person In-Charge		
Language	English	
Relation to curriculum	☐ General ☐ Fundamental ☐ Specialization ☒ Project/Internship/Thesis	☒ Compulsory ☐ Elective
Teaching methods	☐ Lecture ☐ Lesson ☒ Project ☐ Seminar Others, please specify:	

Workload			Lecture	Lab	Project	Internship	Thesis								
		<i>Credit</i>			1										
	Contact hours	37.5	0	0	37.5	0	0								
	Self-Study hours	30	0	0	30	0	0								
	Total workload	67.5	0	0	67.5	0	0								
Credit points	1														
Requirements for taking the course	☒ None ☐ Prerequisite course: <i>(Please specify course ID & course title, if any)</i> ☐ Parallel course: <i>(Please specify course ID & course title, if any)</i> ☐ Previous course: <i>(Please specify course ID & course title, if any)</i>														
Course objectives	Upon successful completion of this course, the students should: • Demonstrate an understanding of scientific method • Communicate scientific knowledge, experiments and conclusions effectively • Demonstrate laboratory experience working with a diverse group of individuals as part of a research team														
Course learning outcomes	Upon the successful completion of this course, students will be able to: <table border="1"> <thead> <tr> <th>Competency level</th> <th>Course learning outcome (CLO)</th> </tr> </thead> <tbody> <tr> <td>Knowledge</td> <td> CLO1. Demonstrate laboratory experience working by performing measurements and perform a statistical analysis of the data CLO2. Describe research projects in an oral presentation and/or written report </td> </tr> <tr> <td>Skill</td> <td> CLO3. Perform safe laboratory practices CLO4. Develop hypotheses, design experiments, and critically analyze results to create new knowledge </td> </tr> <tr> <td>Attitude</td> <td>CLO5. Work with a diverse group of individuals as part of a research team</td> </tr> </tbody> </table>							Competency level	Course learning outcome (CLO)	Knowledge	CLO1. Demonstrate laboratory experience working by performing measurements and perform a statistical analysis of the data CLO2. Describe research projects in an oral presentation and/or written report	Skill	CLO3. Perform safe laboratory practices CLO4. Develop hypotheses, design experiments, and critically analyze results to create new knowledge	Attitude	CLO5. Work with a diverse group of individuals as part of a research team
Competency level	Course learning outcome (CLO)														
Knowledge	CLO1. Demonstrate laboratory experience working by performing measurements and perform a statistical analysis of the data CLO2. Describe research projects in an oral presentation and/or written report														
Skill	CLO3. Perform safe laboratory practices CLO4. Develop hypotheses, design experiments, and critically analyze results to create new knowledge														
Attitude	CLO5. Work with a diverse group of individuals as part of a research team														
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> Weight: lecture session (2.5 hours) Teaching levels: I (Introduce); T (Teach); U (Utilize) Time and place: To be arranged with supervisors.														

	Requirement: - Students are expected to spend a minimum of 3 hours per week in the laboratories/projects of their assigned supervisors. - Specific hours in the lab should be worked out between the supervisors, lab members and the student. - Supervisors will provide evaluation of the student. - Students are expected to participate in the laboratory meetings of their supervisors. - Students will present a 30 minute oral presentation of their project at the conclusion of the course. - Students will submit a 5-page written report of their project at the conclusion of the course.
Examination forms	☐ Multiple-choice questions ☐ Oral examination ☒ Report ☐ Written examination ☐ Presentation ☐ Others, please specify: ☐ Assignments
Other requirements	<u>Attendance:</u> 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. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.
Reading list	

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-6) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	3						
	2	3						
	3	3						
Skills (Level: 1-7)	4			4				
	5			3				
Attitudes (Level: 1-5)	6							4

Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	3.0	0.0	3.5	0.0	0.0	0.0	4.0
L,M,H conversion*		M		M				H

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

4. 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.

5. Date revised: May 20, 20223

Ho Chi Minh City, 20/5/2023

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	An ability to identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	An ability to communicate (in English) effectively with a range of audiences
4	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

RECORD OF REVISIONS

[illegible]



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Project 3

(Đồ án 3)

Course Code: CHE0062IU

1. General information

Course designation	The course is to introduce students to the application of health safety and environment (HSE) concepts in engineering. It emphasizes mainly the management of risk associated with any hazardous products and processes throughout its life cycle. Generally, implementing an HSE program is to minimize and control the risks that come from any hazards of products and processes. This makes HSE an integral part of any engineering discipline.	
Teaching schedule	☐ Year 1 ☐ Year 2 ☒ Year 3 ☐ Year 4 ☐ Year 5 ☐ Semester 1 ☒ Semester 2 ☐ Summer	
Person In-Charge	Dr. Phùng Thanh Khoa, ptkhoa@hcmui.edu.vn	
Language	English	
Relation to curriculum	☐ General ☐ Fundamental ☐ Specialization ☒ Project/Internship/Thesis	☐ Compulsory ☒ Elective
Teaching methods	☒ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify:	

Workload			Lecture	Lab	Project	Internship	Thesis
		<i>Credit</i>			1		
	Contact hours	37.5	0	0	37.5	0	0
	Self-Study hours	30	0	0	30	0	0
	Total workload	67.5	0	0	67.5	0	0
Credit points	1						
Requirements for taking the course	☒ None ☐ Prerequisite course: <i>(Please specify course ID & course title, if any)</i> ☐ Parallel course: <i>(Please specify course ID & course title, if any)</i> ☐ Previous course: <i>(Please specify course ID & course title, if any)</i>						
Course objectives	Upon successful completion of this course, the students should: • Demonstrate an understanding of product handling and management; principles of process system engineering and environment management. • Demonstrate knowledge of dangerous and risky components in a given system or work environment. • Demonstrate knowledge of HSE system.						
Course learning outcomes	Upon the successful completion of this course, students will be able to:						
	Competency level¹	Course learning outcome (CLO)					
	Knowledge	CLO1. Be able to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and environmental [Applying]. CLO2. Be able to identify the potentially dangerous and risky components in a given system or work environment [Evaluating].					
	Skill	CLO3. Be able to perform safe and workplace practices [Mechanism].					

^{1 1} Level of competence according to Bloom's Taxonomy:

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x
Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination
Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x

	Attitude	CLO4. Be able to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts [Valuing].																																													
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> <u>Weight</u>: lecture session (2.5 hours) <u>Teaching levels</u>: I (Introduce); T (Teach); U (Utilize) <table border="1"> <thead> <tr> <th>No.</th><th>Topic</th><th>Weight</th><th>Level</th></tr> </thead> <tbody> <tr> <td>1</td><td>Introduction to Health Safety and Environment</td><td>1</td><td>I, T</td></tr> <tr> <td>2</td><td>Product Handling and Management: Product stewardship, product information guidelines (MSDS, CAS, EINECS, PICCS), toxic and hazardous materials, GMP, HACCP.</td><td>1</td><td>I, T, U</td></tr> <tr> <td>3</td><td>Principles of Process Safety Engineering: Process and system safety (i.e. reactor; storage tank, pressure relief system, etc.), construction safety, equipment safety, fire and explosion, prevention of fires and explosions</td><td>1.5</td><td>I, T, U</td></tr> <tr> <td>4</td><td>Chemical reactivity</td><td>0.5</td><td>I, T, U</td></tr> <tr> <td>5</td><td>Principles of Environmental Engineering: Pollution prevention, air pollution engineering, waste treatment and disposal technologies, storage and containment.</td><td>1</td><td>I, T, U</td></tr> <tr> <td>6</td><td>Principles of Occupational Health and Industrial Hygiene: Chemical handling and hazard assessment (i.e. toxicity levels, OELs), personal protective equipment, equipment safety (ventilation, radiation and noise hazard), and ergonomics.</td><td>1</td><td>I, T, U</td></tr> <tr> <td>7</td><td>Risk Management: Hazard identification, risk assessment, mitigation and control. Hazard evaluation, exposure assessment (quantification), risk characterization (qualification) and accident probability (i.e. hardware and operator failure, event trees and fault trees).</td><td>1</td><td>I, T, U</td></tr> <tr> <td>8</td><td>Introduction to the law in occupational safety and hygiene</td><td>1</td><td>I, T, U</td></tr> <tr> <td>9</td><td>Factory field trip</td><td>1</td><td>I, T, U</td></tr> <tr> <td>10</td><td>Factory field trip</td><td>1</td><td>I, T, U</td></tr> </tbody> </table>			No.	Topic	Weight	Level	1	Introduction to Health Safety and Environment	1	I, T	2	Product Handling and Management: Product stewardship, product information guidelines (MSDS, CAS, EINECS, PICCS), toxic and hazardous materials, GMP, HACCP.	1	I, T, U	3	Principles of Process Safety Engineering: Process and system safety (i.e. reactor; storage tank, pressure relief system, etc.), construction safety, equipment safety, fire and explosion, prevention of fires and explosions	1.5	I, T, U	4	Chemical reactivity	0.5	I, T, U	5	Principles of Environmental Engineering: Pollution prevention, air pollution engineering, waste treatment and disposal technologies, storage and containment.	1	I, T, U	6	Principles of Occupational Health and Industrial Hygiene: Chemical handling and hazard assessment (i.e. toxicity levels, OELs), personal protective equipment, equipment safety (ventilation, radiation and noise hazard), and ergonomics.	1	I, T, U	7	Risk Management: Hazard identification, risk assessment, mitigation and control. Hazard evaluation, exposure assessment (quantification), risk characterization (qualification) and accident probability (i.e. hardware and operator failure, event trees and fault trees).	1	I, T, U	8	Introduction to the law in occupational safety and hygiene	1	I, T, U	9	Factory field trip	1	I, T, U	10	Factory field trip	1	I, T, U
No.	Topic	Weight	Level																																												
1	Introduction to Health Safety and Environment	1	I, T																																												
2	Product Handling and Management: Product stewardship, product information guidelines (MSDS, CAS, EINECS, PICCS), toxic and hazardous materials, GMP, HACCP.	1	I, T, U																																												
3	Principles of Process Safety Engineering: Process and system safety (i.e. reactor; storage tank, pressure relief system, etc.), construction safety, equipment safety, fire and explosion, prevention of fires and explosions	1.5	I, T, U																																												
4	Chemical reactivity	0.5	I, T, U																																												
5	Principles of Environmental Engineering: Pollution prevention, air pollution engineering, waste treatment and disposal technologies, storage and containment.	1	I, T, U																																												
6	Principles of Occupational Health and Industrial Hygiene: Chemical handling and hazard assessment (i.e. toxicity levels, OELs), personal protective equipment, equipment safety (ventilation, radiation and noise hazard), and ergonomics.	1	I, T, U																																												
7	Risk Management: Hazard identification, risk assessment, mitigation and control. Hazard evaluation, exposure assessment (quantification), risk characterization (qualification) and accident probability (i.e. hardware and operator failure, event trees and fault trees).	1	I, T, U																																												
8	Introduction to the law in occupational safety and hygiene	1	I, T, U																																												
9	Factory field trip	1	I, T, U																																												
10	Factory field trip	1	I, T, U																																												
Examination forms	☐ Multiple-choice questions ☐ Oral examination ☐ Report ☒ Written examination ☐ Presentation ☐ Others, please specify:																																														

	☐ Assignments
Other requirements	<u>Attendance:</u> 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. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.
Reading list	I. Textbooks [1] T.S.S. Dikshith, <i>Handbook of Chemicals and Safety</i>, 2017, CRC Press, 2017. [2] Daniel Crowl and Joseph F. Louvar, <i>Chemical Process Safety</i>, Prentice Hall, 3rd edition, 2011. II. References

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	5						
	2		3					
	3							
Skills (Level: 1-7)	4							
	5							
	6						4	
Attitudes (Level: 1-5)	7							3
	8							
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	5.0	3.0	0.0	0.0	0.0	4.0	3.0
L,M,H conversion*		H	M				H	M

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
	1	Introduction to Health Safety and Environment	1, 4		Lecture, Discussion	[1]. [2].
	2	Product Handling and Management: Product stewardship, product information guidelines (MSDS, CAS, EINECS, PICCS), toxic and hazardous materials, GMP, HACCP.	1,2,3 ,4	HW1	Lecture, HW	[1]. [2].
	3	Principles of Process Safety Engineering: Process and system safety (i.e. reactor; storage tank, pressure relief system, etc.), construction safety, equipment safety, fire and explosion, prevention of fires and explosions	1,2,3 ,4	Quiz 1	Lecture, Inclass-Quiz	[1]. [2].
	4	Chemical reactivity	1,2,3 ,4	HW2, Group work	Lecture, Group work, HW	[1]. [2].
	5	Principles of Environmental Engineering: Pollution prevention, air pollution engineering, waste treatment and disposal technologies, storage and containment.	1,2, 3,4	Quiz 2	Lecture, Inclass-Quiz	[1]. [2].
	6	Principles of Occupational Health and Industrial Hygiene: Chemical handling and hazard assessment (i.e. toxicity levels, OELs), personal protective equipment, equipment safety (ventilation, radiation and noise hazard), and ergonomics.	1,2,3 ,4	Quiz 3	Lecture, Inclass-Quiz	[1]. [2].
	7	Risk Management: Hazard identification, risk assessment, mitigation and control. Hazard evaluation, exposure assessment (quantification), risk characterization (qualification) and accident probability (i.e. hardware and operator failure, event trees and fault trees).	1,2,3 ,4	HW3, Group work	Lecture, Group work, HW	[1]. [2].

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
	8	Introduction to the law in occupational safety and hygiene	1,2,4	Group work	Lecture, Group work	
	9	Midterm				
	11,12	Factory Field trip	1,2,3,4	Report	Visiting	
	18	Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
In-class exercises/quizzes/ Homework exercises (10%)	HW1, Qz 1 60%Pass	HW2, Qz 2 60%Pass		HW3, Qz 3 60%Pass
Group work (20%)	50%Pass	50%Pass	50%Pass	50%Pass
Midterm exam (30%)		Q3 50%Pass	Q1, Q2 50%Pass	
Final exam (40%)	Part I 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): No

6. Revision Date: May 20, 2023

Ho Chi Minh City, 20/5/2023

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	An ability to identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	An ability to communicate (in English) effectively with a range of audiences
4	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



**VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY**
School of Chemical and Environmental Engineering

COURSE SYLLABUS

**Course Name: Research Methodology
(Phương pháp nghiên cứu khoa học)**

Course Code: CHE0041IU

1. General information

Course designation	Lectures include an introduction to scientific research, research planning and proposal development, experimental design and hypothesis testing, publication procedure with focus on thesis preparation. Students are requested to conduct a course project that is used to evaluate how theory is applied in practice as well as to develop inter-personal skills.	
Teaching schedule	☐ Year 1 ☐ Year 2 ☐ Year 3 ☒ Year 4 ☐ Year 5 ☐ Semester 1 ☒ Semester 2 ☐ Summer	
Person In-Charge		
Language	English	
Relation to curriculum	☐ General ☐ Fundamental ☐ Specialization ☒ Project/Internship/Thesis	☒ Compulsory ☐ Elective
Teaching methods	☐ Lecture ☐ Lesson ☒ Project ☐ Seminar Others, please specify:	

Workload			Lecture	Lab	Project	Internship	Thesis								
		<i>Credit</i>	2												
	Contact hours	25	25	0	0	0	0								
	Self-Study hours	60	60	0	0	0	0								
	Total workload	85	85	0	0	0	0								
Credit points	2														
Requirements for taking the course	☒ None ☐ Prerequisite course: <i>(Please specify course ID & course title, if any)</i> ☐ Parallel course: <i>(Please specify course ID & course title, if any)</i> ☐ Previous course: <i>(Please specify course ID & course title, if any)</i>														
Course objectives	The Research Methodology course is designed to provide participants with a comprehensive understanding of the fundamental principles, techniques, and processes involved in conducting rigorous and effective research across various disciplines. This course aims to equip students with the skills and knowledge necessary to design, execute, analyze, and interpret research studies in an ethical and methodologically sound manner.														
Course learning outcomes	Upon the successful completion of this course, students will be able to: <table border="1"> <thead> <tr> <th>Competency level</th> <th>Course learning outcome (CLO)</th> </tr> </thead> <tbody> <tr> <td>Knowledge</td> <td> CLO1. Demonstrate an understanding of the scientific research process and how each step interlinks with the other, the requirements for a decent research. CLO2. Demonstrate a basic knowledge of used methodological tools in empirical research, including surveys, interviews, content analysis, case selection and comparison, and basic statistical methods </td> </tr> <tr> <td>Skill</td> <td> CLO3. Develop the research proposal CLO4. Develop the skills of teamworks and problem-solving </td> </tr> <tr> <td>Attitude</td> <td></td> </tr> </tbody> </table>							Competency level	Course learning outcome (CLO)	Knowledge	CLO1. Demonstrate an understanding of the scientific research process and how each step interlinks with the other, the requirements for a decent research. CLO2. Demonstrate a basic knowledge of used methodological tools in empirical research, including surveys, interviews, content analysis, case selection and comparison, and basic statistical methods	Skill	CLO3. Develop the research proposal CLO4. Develop the skills of teamworks and problem-solving	Attitude	
Competency level	Course learning outcome (CLO)														
Knowledge	CLO1. Demonstrate an understanding of the scientific research process and how each step interlinks with the other, the requirements for a decent research. CLO2. Demonstrate a basic knowledge of used methodological tools in empirical research, including surveys, interviews, content analysis, case selection and comparison, and basic statistical methods														
Skill	CLO3. Develop the research proposal CLO4. Develop the skills of teamworks and problem-solving														
Attitude															
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> Weight: lecture session (2.5 hours) Teaching levels: I (Introduce); T (Teach); U (Utilize)														

	No.	Topic	Weight	Level
	1	Lecture 1: Introduction	1	I, T
	2	Lecture 2: Planning a research: problem identification & proposal development	2	T, U
	3	Lecture 3: Testing hypothesis	1	T, U
	4	Lecture 4: Experimental design	2	T
	5	Lecture 5: Writing up (publication process, data presentation and thesis preparation)	2	T, U
	6	Project 1. Project assignment and discussion	2	T
	7	Project 2. Project plan development	1	T, U
	8	Project 3. Review of pilot experiment	1	T, U
	9	Project 4. Revision of project plan for final implementation	0.5	I, T
	10	Project 5. Presentation of project outcomes	0.5	I, T
Examination forms	☐ Multiple-choice questions ☐ Oral examination ☒ Report ☐ Written examination ☐ Presentation ☐ Others, please specify: ☐ Assignments			
Other requirements	<u>Attendance:</u> 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. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.			
Reading list	- Day, R.A. (2011) How to write and publish a scientific paper. Cambridge University Press, USA - Linfield C. Brown, Paul Mac Berthouex (2002) Statistics for Environmental Engineers, Lewis publisher, USA. - John Townend (2003) Practical statistics for environmental and biological scientists. John Wiley & Sons, England			

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-6) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	3						
	2	2						
Skills (Level: 1-7)	3			4				
Attitudes (Level: 1-5)	4							4
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	2.5	0.0	4.0	0.0	0.0	0.0	4.0
L,M,H conversion*		L		M				H

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Lecture 1: Introduction	1			
2.	2	Lecture 2: Planning a research: problem identification & proposal development				
3.	3	Lecture 3: Testing hypothesis	1, 5			
4.	4	Lecture 4: Experimental design	2			
5.	5	Lecture 5: Writing up (publication process,	1,3			

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
		data presentation and thesis preparation)				
6.	6	Final exam				

4. 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.

5. Date revised: May 20, 20223

Ho Chi Minh City, 20/5/2023

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	An ability to identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	An ability to communicate (in English) effectively with a range of audiences
4	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

RECORD OF REVISIONS

No.	Session/Page	Content of revision	Date of revision	Revised by



**VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY**
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Research 1

(Nghiên cứu 1)

Course Code: CHE4012IU

1. General information

Course designation	This course belongs to a series of two courses offered to the students in their 3rd year and the 1st semester of the 4th year. The course is designed to allow the students to be exposed to a wide variety of research areas in Chemical Engineering through participation in laboratory group. The students will learn to devise hypotheses, design experiments that test their hypotheses, record their data in laboratory notebooks, critically analyze the results of their analyses, and present their findings to others.	
Teaching schedule	☐ Year 1 ☐ Year 2 ☒ Year 3 ☐ Year 4 ☐ Year 5 ☐ Semester 1 ☒ Semester 2 ☐ Summer	
Person In-Charge		
Language	English	
Relation to curriculum	☐ General ☐ Fundamental ☐ Specialization ☒ Project/Internship/Thesis	☒ Compulsory ☐ Elective
Teaching methods	☐ Lecture ☐ Lesson ☒ Project ☐ Seminar Others, please specify:	

Workload			Lecture	Lab	Project	Internship	Thesis
		<i>Credit</i>			1		
	Contact hours	37.5	0	0	37.5	0	0
	Self-Study hours	30	0	0	30	0	0
	Total workload	67.5	0	0	67.5	0	0
Credit points	3						
Requirements for taking the course	☒ None ☐ Prerequisite course: <i>(Please specify course ID & course title, if any)</i> ☐ Parallel course: <i>(Please specify course ID & course title, if any)</i> ☐ Previous course: <i>(Please specify course ID & course title, if any)</i>						
Course objectives	Upon successful completion of this course, the students should: • Demonstrate an understanding of scientific method • Communicate scientific knowledge, experiments and conclusions effectively • Demonstrate laboratory experience working with a diverse group of individuals as part of a research team						
Course learning outcomes	Upon the successful completion of this course, students will be able to:						
	Competency level		Course learning outcome (CLO)				
	Knowledge		CLO1. Demonstrate laboratory experience working by performing measurements and perform a statistical analysis of the data CLO2. Describe research projects in an oral presentation and/or written report				
	Skill		CLO3. Develop hypotheses, design experiments, and critically analyze results to create new knowledge CLO4. Perform safe laboratory practices				
	Attitude		CLO5. Work with a diverse group of individuals as part of a research team.				
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> Weight: lecture session (2.5 hours)						

	Teaching levels: I (Introduce); T (Teach); U (Utilize) Time and place: To be arranged with supervisors. Requirement: • Students are expected to spend a minimum of 3 hours per week in the laboratories/projects of their assigned supervisors. • Specific hours in the lab should be worked out between the supervisors, lab members and the student. • Supervisors will provide evaluation of the student. • Students are expected to participate in the laboratory meetings of their supervisors. • Students will present a 30 minute oral presentation of their project at the conclusion of the course. • Students will submit a 5-page written report of their project at the conclusion of the course.
Examination forms	☐ Multiple-choice questions ☐ Oral examination ☒ Report ☐ Written examination ☐ Presentation ☐ Others, please specify: ☐ Assignments
Other requirements	<u>Attendance:</u> 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. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.
Reading list	

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	3						
	2	3						
	3	2						

Skills (Level: 1-7)	4			4				
Attitudes (Level: 1-5)	5							4
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	2.7	0.0	4.0	0.0	0.0	0.0	4.0
L,M,H conversion*		L		M				H

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

4. Assessment plan

Assessment component (1)	Assessment form (A.x.x) (2)	Percentage % (3)
A1. Process assessment	A1.1 Attendance and Attitude	20
	A1.2 Performance	20
	A1.3 Oral presentation	30
	A1.4 Written report	30
A2. Midterm assessment		0
A3. Final assessment		0

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

5. Date revised: May 20, 20223

Ho Chi Minh City, 20/5/2023

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	An ability to identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	An ability to communicate (in English) effectively with a range of audiences
4	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

RECORD OF REVISIONS

No.	Session/Page	Content of revision	Date of revision	Revised by



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: INTERNSHIP 1

(Thực tập 1)

Course Code: CHE4062IU

1. General information

Course designation	This course requires students to organize field trips by School of Chemical and Environmental Engineering to learn the functional activities in chemical engineering field. Through observing and exchanging information with officials and experts at the institute, companies, students will better understand chemical engineering in practice and aggregate these understandings into a report.	
Teaching schedule	☐ Year 1 ☒ Year 2 ☐ Year 3 ☐ Year 4 ☐ Year 5 ☐ Semester 1 ☒ Semester 2 ☐ Summer	
Person In-Charge	Lecturers from the School of Chemical and Environmental Engineering On-site supervisors	
Language	English	
Relation to curriculum	☐ General ☐ Fundamental ☐ Specialization ☒ Project/Internship/Thesis	☒ Compulsory ☐ Elective
Teaching methods	☐ Lecture ☐ Lesson ☒ Project ☐ Seminar Others, please specify:	

Workload			Lecture	Lab	Project	Internship	Thesis
		<i>Credit</i>				2	
	Contact hours	75	0	0	0	75	0
	Self-Study hours	60	0	0	0	60	0
	Total workload	135	0	0	0	135	0
Credit points	2						
Requirements for taking the course	☒ None ☐ Prerequisite course: <i>(Please specify course ID & course title, if any)</i> ☐ Parallel course: <i>(Please specify course ID & course title, if any)</i> ☐ Previous course: <i>(Please specify course ID & course title, if any)</i>						
Course objectives	The course is aimed at helping students gain career awareness and orientation during study and research in the following academic years and after graduation. Through the course, students will develop the proactive ability to contact with businesses, meet businesspeople, and deeply study some functional activities of businesses in the field of chemical engineering or environmental engineering.						
Course learning outcomes	Upon the successful completion of this course, students will be able to:						
	Competency level	Course learning outcome (CLO)					
	Knowledge	CLO1. Demonstrate the area of environmental engineering that the student worked in [Applying] CLO2. Demonstrate practical experience gained in environmental treatment processing, design, operation, analysis and research. [Applying]					
	Skill	CLO3. Show the observation and perception skills. [Set] CLO4. Show the ability to analyze information. [Set] CLO5. Display effectively oral and written communication skills. [Mechanism]					
	Attitude	CLO6. Display serious and professional attitude. [Internalizing values]					
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> Weight: lecture session (2.5 hours) Teaching levels: I (Introduce); T (Teach); U (Utilize)						
	Topic					Weight	Level

	Background information on the company (4 trips to 4 companies) 1. Background 2. Organization 3. Related environmental engineering areas		T,U
	Evaluate knowledge/skills learned and developed Conclude with ongoing considerations Writing a report		T,U
Examination forms	☐ Multiple-choice questions ☐ Oral examination ☒ Report ☐ Written examination ☐ Presentation ☐ Others, please specify: ☐ Assignments		
Other requirements	<u>Attendance:</u> 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. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.		
Reading list			

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-6) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	3						
	2	3						
Skill (Level: 1-7)	3			3				
	4						2	
	5					4		
Attitudes (Level: 1-5)	6							4
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	3.0	0.0	3.0	0.0	4.0	2.0	4.0
L,M,H conversion *		M		M		M	L	H

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
1	Fieldtrip 1	1 → 6	Report	Observation , discussion	
2	Fieldtrip 2	1 → 6	Report	Observation , discussion	
3	Fieldtrip 3	1 → 6	Report	Observation , discussion	
4	Fieldtrip 4	1 → 6	Report	Observation , discussion	

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4	CLO5	CLO6
Attendance and activities (A1) (20%)	R1.1	R1.2	R1.3	R1.4	R1.2	R1.5
Report (A2) (80%)	R2.2	R2.3	R2.4,5		R2.3	R2.1

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

5. Date revised: May 20, 20223

Ho Chi Minh City, 20/5/2023

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	An ability to identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	An ability to communicate (in English) effectively with a range of audiences
4	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

RECORD OF REVISIONS

No.	Session/Page	Content of revision	Date of revision	Revised by



**VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY**
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Internship 2

(Thực Tập 2)

Course Code: CHE4062IU

1. General information

Course designation	Internships are opportunities for the students to learn about and apply chemical engineering principles outside the classroom in the laboratory, work place and/or field. Before the internship, the faculty mentor assign the student responsibilities that have been previously agreed upon and approved by the department/school chair. These duties will vary depending on the particular discipline. The student will work accordingly under the guidance and direction of an internship mentor who is an employee of the internship site. In the end, students will submit to the department a written report and give an oral presentation in front of the committee of works done, and a report card including remarks and recommendations from the internship mentor.	
Teaching schedule	☐ Year 1 ☒ Year 2 ☐ Year 3 ☐ Year 4 ☐ Year 5 ☐ Semester 1 ☐ Semester 2 ☒ Summer	
Person In-Charge	Faculty of Department of Chemical Engineering	
Language	English	
Relation to curriculum	☐ General ☐ Fundamental ☐ Specialization ☒ Project/Internship/Thesis	☒ Compulsory ☐ Elective
Teaching methods	☐ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify: internship	

Workload			Lecture	Lab	Project	Internship	Thesis
		Credit				3	
	Contact hours	112.5	0	0	0	112.5	0
	Self-Study hours	90	0	0	0	90	0
	Total workload	202.5	0	0	0	202.5	0
Credit points	3						
Requirements for taking the course	☐ None ☐ Prerequisite course: ☐ Parallel course: (Please specify course ID & course title, if any) ☐ Previous course: Internship 1 (CHE4052IU)						
Course objectives	To get practical experience, students spend at least for 8 weeks at factories, R&D divisions, research institutes, or technical sales departments in Vietnam or overseas. This course aims to provide students with opportunities to explore their career options as well as opportunities to relate their academic preparation to the reality of conducting professional practice, interact with others in practice effectively, develop professional skills, and communicate effectively in the workplace. It also aims to provide opportunities for students to gain real-world experience that will be essential for their future practice as engineers in their particular discipline after graduation.						
Course learning outcomes	Upon the successful completion of this course, students will be able to:						
	Competency level ¹	Course learning outcome (CLO)					
	Knowledge	CLO1. Apply the theoretical knowledge gained in their academic coursework to real-world engineering problems. [Apply]					
	Skill	CLO2. Function effectively in multidisciplinary teams and individuals to accomplish planned tasks and goals. [Adaptation] CLO3. Communicate effectively in a professional environment, both orally and in writing, including technical report writing and presentation skills. [Set]					
	Attitude	CLO4. Evaluate various engineering situations and judgments on the basis of ethical codes and professional responsibilities. [Organization]					
¹ Level of competence according to Bloom's Taxonomy:							
	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Knowledge	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	x

Skills	Perception	Set	Guided Response	Mechanism	Complex Overt Response	Adaptation	Origination
Attitudes	Receiving Phenomena	Responding to Phenomena	Valuing	Organization	Internalizing values	x	x
Content	<u>Weight</u>: lecture session (2.5 hours) <u>Teaching levels</u>: I (Introduce); T (Teach); U (Utilize)						
	No.	Topic	Weight	Level			
	1	Orientation and Training: Introduction to the internship program and its objectives. Familiarization with the workplace, safety protocols, and ethical guidelines. Training on specific tools, equipment, and software relevant to the internship.	1	I			
	2	Project Assignment and Planning: Assignment of specific project(s) based on student's interests and host organization's requirements. Development of a project plan, including objectives, timeline, and deliverables. Identification of resources needed for project execution.	2	T, U			
	3	Project Execution and Technical Skills Development: Active involvement in chemical engineering projects under the guidance of a mentor. Application of engineering principles to solve practical problems and optimize processes. Hands-on experience in operating and troubleshooting equipment and processes. Data collection, analysis, and interpretation using appropriate tools and techniques. Collaboration with colleagues to achieve project milestones. Regular progress reporting and documentation of work.	1	U			
	4	Professional Development and Communication: Workshop on effective communication and presentation skills. Preparation of a final report summarizing the internship experience and project outcomes. Presentation of the internship project to a panel of industry professionals and peers. Reflection on the ethical and professional responsibilities associated with the chemical engineering field. Networking opportunities, including interaction with professionals from the host organization and industry.		U			

Examination forms	☐ Multiple-choice questions ☐ Oral examination ☒ Report ☐ Written examination ☒ Presentation ☐ Others, please specify: ☐ Assignments
Other requirements	<u>Attendance:</u> Following the company's policy <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.
Reading list	Internal documents from company

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1		3					
Skills (Level: 1-7)	2				6			
	3				2	2		
Attitudes (Level: 1-5)	4							4
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	0.0	3.0	0.0	4.0	2.0	0.0	4.0
L,M,H conversion*			M		H	L		H

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Orientation and Training			Introduction	
2.	2	Project Assignment and Planning	1	report	Individual meeting	
3.	3	Project Execution and Technical Skills Development	2,4	report	meeting	

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
4.	4	Project Execution and Technical Skills Development	2,4	Project Execution and Technical Skills		
5.	5	Project Execution and Technical Skills Development	2,4	Project Execution and Technical Skills	Report	
6.	6	Project Execution and Technical Skills Development	2,4	Project Execution and Technical Skills		
7.	7	Project Execution and Technical Skills Development	2,4	Project Execution and Technical Skills	Review & Report	
8.	8	Professional Development and Communication	3	Report & Presentation	Presentation	

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
Evaluation of the instructor at the internship organization (50%)			Report, Presentation 60%Pass	
Evaluation of faculty mentor (50%)			Report, Presentation 60%Pass	

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

5. Rubrics (optional):

6. Revision Date: May 20, 2023

Ho Chi Minh City, 20/5/2023

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Internship 3

(Thực tập 3)

Course Code: CHE4072IU

1. General information

Course designation	The chemical engineering Internship program provides students with practical, hands-on experience in the field of chemical engineering. This course aims to bridge the gap between classroom learning and real-world application by offering students the opportunity to work in an industrial or research setting. Through this internship, students will gain valuable insights into the chemical engineering profession, enhance their technical skills, and develop a professional network.	
Teaching schedule	☐ Year 1 ☐ Year 2 ☒ Year 3 ☐ Year 4 ☐ Year 5 ☐ Semester 1 ☐ Semester 2 ☒ Summer	
Person In-Charge	Faculty of Department of Chemical Engineering	
Language	English	
Relation to curriculum	☐ General ☐ Fundamental ☐ Specialization ☒ Project/Internship/Thesis	☒ Compulsory ☐ Elective
Teaching methods	☐ Lecture ☐ Lesson ☐ Project ☐ Seminar Others, please specify:	

Workload			Lecture	Lab	Project	Internship	Thesis								
		<i>Credit</i>	0			3									
	Contact hours	112.5	0	0	0	112.5	0								
	Self-Study hours	90	0	0	0	90	0								
	Total workload	202.5	0	0	0	202.5	0								
Credit points	3														
Requirements for taking the course	☐ None ☐ Prerequisite course: <i>(Please specify course ID & course title, if any)</i> ☐ Parallel course: <i>(Please specify course ID & course title, if any)</i> ☒ Previous course: Internship 1 (CHE4052IU), Internship 2 (CHE4062IU)														
Course objectives	To get practical experience, students spend at least for 8 weeks at factories, R&D divisions, research institutes, or technical sales departments in Vietnam or overseas. This course aims to provide students with opportunities to explore their career options as well as opportunities to relate their academic preparation to the reality of conducting professional practice, interact with others in practice effectively, develop professional skills, and communicate effectively in the workplace. It also aims to provide opportunities for students to gain real-world experience that will be essential for their future practice as engineers in their particular discipline after graduation.														
Course learning outcomes	Upon the successful completion of this course, students will be able to: <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 15%;">Competency level</th> <th>Course learning outcome (CLO)</th> </tr> </thead> <tbody> <tr> <td>Knowledge</td> <td>CLO1. Apply the theoretical knowledge gained in their academic coursework to real-world engineering problems. [Apply]</td> </tr> <tr> <td>Skill</td> <td> CLO2. Function effectively in multidisciplinary teams and individuals to accomplish planned tasks and goals. [Adaptation] CLO3. Communicate effectively in a professional environment, both orally and in writing, including technical report writing and presentation skills. [Set] </td> </tr> <tr> <td>Attitude</td> <td>CLO4. Evaluate various engineering situations and judgments on the basis of ethical codes and professional responsibilities. [Organization]</td> </tr> </tbody> </table>							Competency level	Course learning outcome (CLO)	Knowledge	CLO1. Apply the theoretical knowledge gained in their academic coursework to real-world engineering problems. [Apply]	Skill	CLO2. Function effectively in multidisciplinary teams and individuals to accomplish planned tasks and goals. [Adaptation] CLO3. Communicate effectively in a professional environment, both orally and in writing, including technical report writing and presentation skills. [Set]	Attitude	CLO4. Evaluate various engineering situations and judgments on the basis of ethical codes and professional responsibilities. [Organization]
Competency level	Course learning outcome (CLO)														
Knowledge	CLO1. Apply the theoretical knowledge gained in their academic coursework to real-world engineering problems. [Apply]														
Skill	CLO2. Function effectively in multidisciplinary teams and individuals to accomplish planned tasks and goals. [Adaptation] CLO3. Communicate effectively in a professional environment, both orally and in writing, including technical report writing and presentation skills. [Set]														
Attitude	CLO4. Evaluate various engineering situations and judgments on the basis of ethical codes and professional responsibilities. [Organization]														

Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i>			
	<u>Weight</u> : lecture session (2.5 hours)			
	<u>Teaching levels</u> : I (Introduce); T (Teach); U (Utilize)			
	No.	Topic	Weight	Level
	1	Orientation and Training: Introduction to the internship program and its objectives. Familiarization with the workplace, safety protocols, and ethical guidelines. Training on specific tools, equipment, and software relevant to the internship.	1	I
	2	Project Assignment and Planning: Assignment of specific project(s) based on student's interests and host organization's requirements. Development of a project plan, including objectives, timeline, and deliverables. Identification of resources needed for project execution.	2	T, U
3	Project Execution and Technical Skills Development: Active involvement in chemical engineering projects under the guidance of a mentor. Application of engineering principles to solve practical problems and optimize processes. Hands-on experience in operating and troubleshooting equipment and processes. Data collection, analysis, and interpretation using appropriate tools and techniques. Collaboration with colleagues to achieve project milestones. Regular progress reporting and documentation of work.	1	U	
4	Professional Development and Communication: Workshop on effective communication and presentation skills. Preparation of a final report summarizing the internship experience and project outcomes. Presentation of the internship project to a panel of industry professionals and peers. Reflection on the ethical and professional responsibilities associated with the chemical engineering field. Networking opportunities,		U	

		including interaction with professionals from the host organization and industry.			
Examination forms	☐ Multiple-choice questions ☐ Oral examination ☒ Report ☐ Written examination ☒ Presentation ☐ Others, please specify: ☐ Assignments				
Other requirements	<u>Attendance:</u> Following the company's policy <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.				
Reading list	Internal documents from company				

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1		3					
Skills (Level: 1-7)	2				6			
	3				2	2		
Attitudes (Level: 1-5)	4							4
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	0.0	3.0	0.0	4.0	2.0	0.0	4.0
L,M,H conversion*			M		H	L		H

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
1.	1	Orientation and Training				
2.	2	Project Assignment and Planning	1			
3.	3	Project Execution and Technical Skills Development	2,4			

No.	Week	Topic	CLO	Assessments	Learning activities	Resources
4.	4	Project Execution and Technical Skills Development	2,4			
5.	5	Project Execution and Technical Skills Development	2,4			
6.	6	Project Execution and Technical Skills Development	2,4			
7.	7	Project Execution and Technical Skills Development	2,4			
8.	8	Professional Development and Communication	3			

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4	CLO5	CLO6	CLO7
Onsite supervisor's assessment (A1) (50%)	R1.1	R1.2	R1.3	R1.4	R1.2	R1.5	R1.6, R1.7
Instructor's assessment (A2) (50%)	R2.2	R2.3	R2.4,5		R2.3	R2.1	

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

5. Rubrics (optional): No

5.1. Rubrics for onsite supervisor assessment (R1)

Criteria	%	Level					
		Excellent	Very good	Good	Fair	Average	Weak
		90≤ ≤100	80≤ <90	70≤ <80	60≤ <70	50≤ <60	<50
1. Level of understanding the area of chemical engineering that the student worked in	5	Excellent					Weak
2. Ability in applying knowledge and skills learned in the university in a work setting.	30	Excellent					Weak

Criteria	%	Level					
		Excellent	Very good	Good	Fair	Average	Weak
		90≤ ≤100	80≤ <90	70≤ <80	60≤ <70	50≤ <60	<50
3. Level of gaining practical experience within the company environment	30	Excellent					Weak
4. Level of problem-solving skills	5	Demonstrates complete understanding of the problem. All requirements of task are included in response					Demonstrates little understanding of the problem. More than 50% requirements of task are missing.
5. Level of effectively oral and written communication skills	5	Display effectively oral and written communication skills					No/little oral and written communication skills are displayed
6. Level of appreciating different enterprise cultures and working successfully in company environment	5	Adapt well different enterprise cultures and working successfully in company environment					Cannot adapt different enterprise cultures and cannot working in company environment
7. Level of professional behavior that student shows in organization	5	Treating managers, colleagues and clients with respect; Projecting a positive attitude; Being polite; Showing good judgment; Dressing appropriately					Treating managers, colleagues and clients without respect Projecting a negative attitude Being impolite Showing strongly bias judgment; Dressing inappropriately
8. Student shows ethics, integrity and responsibility in company environment	5	Being ethical, Integrity and high responsible to the assigned works					Being unethical Dishonesty, Irresponsible for the assigned works
9. Ability of student in self-identifying their strength, weakness	5	Identifying accurately strength, weakness					Cannot identifying strength, weakness
10. Level of proactive vision and intention in career	5	Proactive					Inactive
Total	100						

5.2. Rubrics for instructor assessment (R2)

Criteria	%	Level					
		Excellent	Very good	Good	Fair	Average	Weak
		90≤ ≤100	80≤ <90	70≤ <80	60≤ <70	50≤ <60	<50

1. Writing skills and format	5	Compliance well to guidelines					Not follow
2. Background information on the company	5	relevant, sufficient, clear					Irrelevant, insufficient, unclear
3. Student position and responsibilities in the internship - Task - Achievement - Strengths - Weakness	80	Present clearly the tasks, and the achievement; sufficient weight for an internship; Identifying accurately strength, weakness					Tasks and achievement are unclear; insufficient weight for an internship; Cannot identifying strength, weakness
4. Evaluate knowledge/skills learned and developed	5	Evaluate accurately the skills learned and developed					Cannot evaluate accurately the skills learned and developed
5. Conclude with ongoing considerations	5	Conclusion and recommendation are precise and accurate					Conclusion and recommendation are ambiguous and inaccurate
Total	100						

6. Revision Date: May 20, 2023

Ho Chi Minh City, 20/5/2023

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	Communicate (in English) effectively with a range of audiences
4	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	Acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

REVISION HISTORY AND NOTES

[illegible]



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Pre-thesis

(Đề cương Luận văn)

Course Code: CHE4512IU

1. General information

Course designation	The Pre-Thesis in Chemical Engineering is a specialized course designed to guide students through the initial stages of their thesis research in the field of chemical engineering. Through interactive discussions, hands-on workshops, and expert guidance, students will develop a deep understanding of the research process, refine their research proposals, and lay the foundation for their upcoming thesis projects.	
Teaching schedule	☐ Year 1 ☐ Year 2 ☐ Year 3 ☒ Year 4 ☐ Year 5 ☐ Semester 1 ☒ Semester 2 ☐ Summer	
Person In-Charge	Lecturers from the School of Chemical and Environmental Engineering	
Language	English	
Relation to curriculum	☐ General ☐ Fundamental ☐ Specialization ☒ Project/Internship/Thesis	☒ Compulsory ☐ Elective
Teaching methods	☐ Lecture ☐ Lesson ☒ Project ☐ Seminar Others, please specify:	

Workload			Lecture	Lab	Project	Internship	Thesis
		Credit					2
	Contact hours	75	0	0	0	0	75
	Self-Study hours	60	0	0	0	0	60
	Total workload	135	0	0	0	0	135
Credit points	2						
Requirements for taking the course	☒ None ☐ Prerequisite course: (Please specify course ID & course title, if any) ☐ Parallel course: (Please specify course ID & course title, if any) ☐ Previous course: (Please specify course ID & course title, if any)						
Course objectives	Understanding research landscape, research proposal development, methodology and experimental design, data collection and analysis, literature review refinement, ethical considerations, presentation and communication skills, time management and project planning						
Course learning outcomes	Upon the successful completion of this course, students will be able to:						
	Competency level	Course learning outcome (CLO)					
	Knowledge	CLO1. Identify basically the issues and the scope of technical issues, identify the important factors [Analyzing] CLO2. Describe basically chemical problems by parameters and calculations, then defend a conclusion about the chemical problem [Evaluating] CLO3. Analyze current applied solutions, their advantages/disadvantages and propose solutions for a practical chemical problem [Analyzing]					
	Skill	CLO4. Develop basically the skills to review and write a thesis proposal [Adaptation]					
	Attitude	CLO5. Recognize scientific misconduct and plagiarism; displays a professional commitment to scientific ethics [Organization]					
Content	The description of the contents should clearly indicate the weighting of the content and the level. Weight: lecture session (2.5 hours) Teaching levels: I (Introduce); T (Teach); U (Utilize)						

	Topic	Week	Level
	Introduction to Thesis Research	1	T,U
	Understanding Research Landscape	2	T,U
	Formulating Research Objectives	3	T,U
	Research Methodology Selection	4	
	Experimental Design and Data Collection	5	
	Data Analysis and Interpretation	6	
	Literature Review Refinement	7	
	Ethical Considerations in Research	8	
	Time Management and Project Planning	9	
	Effective Communication Skills	10	
Examination forms	☐ Multiple-choice questions ☒ Oral examination ☒ Report ☐ Written examination ☐ Presentation ☐ Others, please specify: ☐ Assignments		
Other requirements	<u>Attendance:</u> 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. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.		
Reading list			

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-6) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
	1	3		2				

Knowledge (Level: 1-6)	2	3		3				
	3	2		3				
Skill (Level: 1-7)	4					5		
Attitudes (Level: 1-5)	5							5
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	2.7	0.0	2.7	0.0	5.0	0.0	5.0
L,M,H conversion *		L		L		H		H

*L (Low); M (Medium); H (High)

3. Planned learning activities and teaching methods

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4	CLO5
Attendance and activities (20%)	>50% pass	>50% pass	>50% pass	>50% pass	>50% pass
Report (80%)		>50% pass		>50% pass	

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

5. Date revised: May 20, 20223

Ho Chi Minh City, 20/5/2023

Dean of School of Chemical and Environmental Engineering

Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	An ability to identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	An ability to communicate (in English) effectively with a range of audiences
4	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

RECORD OF REVISIONS

[illegible]



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Chemical and Environmental Engineering

COURSE SYLLABUS

Course Name: Thesis

(Luận văn)

Course Code: CHE4522IU

1. General information

Course designation	Thesis is a semester-long course taken at the senior year following the success of the pre-thesis work. This is an independent work, students are expected to spend about 30 h/per week. Students work on a specific research topic whose plan has been developed in detail. Students and advisors meet to discuss together as much as needed. The work can be the experiments to discover the effects of certain factors on a scientific issue. For an unsatisfactory work, students must prolong the time until completion. In an unavoidable situation, students may require to change the topic or the advisor. The course culminates in a written thesis report. Students also defend their results in an oral presentation in front of a Department faculty committee, in due form.	
Teaching schedule	☐ Year 1 ☐ Year 2 ☐ Year 3 ☐ Year 4 ☒ Year 5	
	☐ Semester 1 ☒ Semester 2 ☐ Summer	
Person In-Charge	Associate Prof. Huynh Kim Lam Dr. Vu Bao Khanh Dr. Phung Thanh Khoa Dr. Nguyen Thao Trang Dr. Doan Hoai Linh	
Language	English	
Relation to curriculum	☐ General ☐ Fundamental ☐ Specialization	☒ Compulsory ☐ Elective

	☒ Project/Internship/Thesis																																				
Teaching methods	☐ Lecture ☐ Lesson ☒ Project ☐ Seminar Others, please specify:																																				
Workload	<table border="1"> <tr> <td></td><td></td><td>Lecture</td><td>Lab</td><td>Project</td><td>Internship</td><td>Thesis</td></tr> <tr> <td></td><td><i>Credit</i></td><td></td><td></td><td></td><td></td><td>10</td></tr> <tr> <td>Contact hours</td><td>375</td><td>0</td><td>0</td><td>0</td><td>0</td><td>375</td></tr> <tr> <td>Self-Study hours</td><td>300</td><td>0</td><td>0</td><td>0</td><td>0</td><td>300</td></tr> <tr> <td>Total workload</td><td>675</td><td>0</td><td>0</td><td>0</td><td>0</td><td>675</td></tr> </table>				Lecture	Lab	Project	Internship	Thesis		<i>Credit</i>					10	Contact hours	375	0	0	0	0	375	Self-Study hours	300	0	0	0	0	300	Total workload	675	0	0	0	0	675
		Lecture	Lab	Project	Internship	Thesis																															
	<i>Credit</i>					10																															
Contact hours	375	0	0	0	0	375																															
Self-Study hours	300	0	0	0	0	300																															
Total workload	675	0	0	0	0	675																															
Credit points	10																																				
Requirements for taking the course	☐ None ☐ Prerequisite course: <i>(Please specify course ID & course title, if any)</i> ☐ Parallel course: <i>(Please specify course ID & course title, if any)</i> ☒ Previous course: <i>Pre-thesis</i>																																				
Course objectives	After finishing this course students acquire knowledge and comprehension of the research process. They know how to identify a scientific issue, apply their knowledge to solve a scientific problem. They learn how to communicate their scientific findings to the greater scientific community using manuscript, poster and oral presentation. They feel confident enough about their scientific discoveries to discuss and defend their findings and how they related to the greater scientific community.																																				
Course learning outcomes	Upon the successful completion of this course, students will be able to: <table border="1"> <tr> <th>Competency level</th><th>Course learning outcome (CLO)</th></tr> <tr> <td>Knowledge</td><td>CLO1. Searching the literature relevant to the topic; Differentiating between primary, secondary and tertiary sources of information; Producing a critical review of the literature relevant to the topic to be studied.</td></tr> <tr> <td>Skill</td><td>CLO2. Formulating a hypothesis; Carrying out the investigations; Collecting, collating and analyzing data from their investigations. CLO3. Drawing valid conclusions from the analysis of the data; Discussing the relevance of the conclusions in the context of the literature relating to that topic. CLO4. Reporting the findings of the investigation by manuscript; oral presentation; poster. Orally describe, discuss and defend their work.</td></tr> <tr> <td>Attitude</td><td>CLO5. Formulate the perseverance, and flexibility in solving the problem [organization] CLO6. Form proactive vision and intention in career [valuing]</td></tr> </table>		Competency level	Course learning outcome (CLO)	Knowledge	CLO1. Searching the literature relevant to the topic; Differentiating between primary, secondary and tertiary sources of information; Producing a critical review of the literature relevant to the topic to be studied.	Skill	CLO2. Formulating a hypothesis; Carrying out the investigations; Collecting, collating and analyzing data from their investigations. CLO3. Drawing valid conclusions from the analysis of the data; Discussing the relevance of the conclusions in the context of the literature relating to that topic. CLO4. Reporting the findings of the investigation by manuscript; oral presentation; poster. Orally describe, discuss and defend their work.	Attitude	CLO5. Formulate the perseverance, and flexibility in solving the problem [organization] CLO6. Form proactive vision and intention in career [valuing]																											
Competency level	Course learning outcome (CLO)																																				
Knowledge	CLO1. Searching the literature relevant to the topic; Differentiating between primary, secondary and tertiary sources of information; Producing a critical review of the literature relevant to the topic to be studied.																																				
Skill	CLO2. Formulating a hypothesis; Carrying out the investigations; Collecting, collating and analyzing data from their investigations. CLO3. Drawing valid conclusions from the analysis of the data; Discussing the relevance of the conclusions in the context of the literature relating to that topic. CLO4. Reporting the findings of the investigation by manuscript; oral presentation; poster. Orally describe, discuss and defend their work.																																				
Attitude	CLO5. Formulate the perseverance, and flexibility in solving the problem [organization] CLO6. Form proactive vision and intention in career [valuing]																																				

Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> Weight: lecture session (2.5 hours) Teaching levels: I (Introduce); T (Teach); U (Utilize) <table border="1"> <thead> <tr> <th>No.</th><th>Topic</th><th>Weight</th><th>Level</th></tr> </thead> <tbody> <tr> <td>1</td><td>Chapter 1: Introduction</td><td></td><td></td></tr> <tr> <td>2</td><td>Chapter 2: Literature Review</td><td></td><td></td></tr> <tr> <td>3</td><td>Chapter 3: Methodology</td><td></td><td></td></tr> <tr> <td>4</td><td>Chapter 4: Case Studies</td><td></td><td></td></tr> <tr> <td>5</td><td>Chapter 5: Results and Discussion</td><td></td><td></td></tr> <tr> <td>6</td><td>Chapter 6: Conclusion and Future Work</td><td></td><td></td></tr> <tr> <td>7</td><td>References</td><td></td><td></td></tr> <tr> <td>8</td><td>Appendices (if applicable)</td><td></td><td></td></tr> </tbody> </table>	No.	Topic	Weight	Level	1	Chapter 1: Introduction			2	Chapter 2: Literature Review			3	Chapter 3: Methodology			4	Chapter 4: Case Studies			5	Chapter 5: Results and Discussion			6	Chapter 6: Conclusion and Future Work			7	References			8	Appendices (if applicable)		
No.	Topic	Weight	Level																																		
1	Chapter 1: Introduction																																				
2	Chapter 2: Literature Review																																				
3	Chapter 3: Methodology																																				
4	Chapter 4: Case Studies																																				
5	Chapter 5: Results and Discussion																																				
6	Chapter 6: Conclusion and Future Work																																				
7	References																																				
8	Appendices (if applicable)																																				
Examination forms	☐ Multiple-choice questions ☐ Oral examination ☐ Report ☒ Written examination ☒ Presentation ☐ Others, please specify: ☐ Assignments																																				
Other requirements	<u>Attendance:</u> 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. <u>Assignments/Examination:</u> Students must have more than 50/100 points overall to pass this course.																																				
Reading list																																					

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Intended Learning Outcomes (ILO) (1-7) is shown in the following table:

CLOs		ILOs						
		Knowledge		Skills				Attitudes
		1	2	3	4	5	6	7
Knowledge (Level: 1-6)	1	4						
	2	4						
Skills (Level: 1-7)	3			4				
Attitudes (Level: 1-5)	4							5
Contribution of CLOs to ILOs								
Bloom's Taxonomy	AVE	4.0	0.0	4.0	0.0	0.0	0.0	5.0
L,M,H conversion*		M		M				H

*L (Low); M (Medium); H (High)

3. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4	CLO5	CLO6
Process assessment	70% pass	80% pass	100% pass	100% pass	100% pass	100% pass
Reviewer assessment	70% pass	80% pass	100% pass	100% pass	100% pass	100% pass
Committee assessment	70% pass	80% pass	100% pass	100% pass	100% pass	100% pass

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

4. Date revised: May 20, 20223

Hồ Chí Minh City, 20/5/2023

Dean of School of Chemical and Environmental Engineering



Huỳnh Kim Lâm

(*) Intended Learning Outcomes

No.	Program Learning Outcomes Graduates of Chemical Engineering program will attain
<i>Knowledge</i>	
1	An ability to identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics
2	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<i>Skills</i>	
3	An ability to communicate (in English) effectively with a range of audiences
4	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
5	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
6	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
<i>Attitude</i>	
7	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

For administrative purposes

RECORD OF REVISIONS

No.	Session/Page	Content of revision	Date of revision	Revised by

Phụ lục 3

**BẢNG MÔ TẢ SỐ TÍN CHỈ THỰC TẬP CỦA CHƯƠNG TRÌNH ĐÀO TẠO
ĐƯỢC THỂ HIỆN CỤ THỂ THEO MÔN HỌC ĐỂ ĐẢM BẢO 8 TÍN CHỈ
THỰC TẬP THEO QUY ĐỊNH TẠI THÔNG TƯ 17/2021/TT-BGDĐT**

*(Kèm theo Quyết định số /QĐ-ĐHQT ngày tháng năm 2023
của Hiệu trưởng Trường Đại học Quốc tế)*

TT.	Mã MH	Tên môn học		Loại MH (bắt buộc/ tự chọn)	Tín chỉ			Môn học tiên quyết (TQ)/ Môn học học trước (HT)/ Môn học song hành (SH)
		Tiếng Việt	Tiếng Anh		Tổng cộng	Lý thuyết	Thực tập	
1	CHE4062IU	Thực tập 1	Internship 1	Bắt buộc	2	0	2	Không
2	CHE4072IU	Thực tập 2	Internship 2	Bắt buộc	3	0	3	Internship 1
3	CHE4082IU	Thực tập 3	Internship 3	Bắt buộc	3	0	3	Internship 2
	Tổng				8			