

Specialization: CHEMICAL ENGINEERING TECHNOLOGY

Specialization 1: ENVIRONMENTAL CHEMISTRY

Specialization 2: THE CHEMISTRY OF NATURAL COMPOSITIONS

I. PROGRAM OBJECTIVES AND EXPECTED LEARNING OUTCOME (ELO)

1.1. Program objectives

Students after graduating from Chemical Engineering Technology gain the following competencies

Program objective 1 (PO1): Having good professional knowledge, professional ethics, sense of responsibility, high professionalism; Good problem solving, teamwork and communication skills.

Program objective 2 (PO2): Capable of lifelong self-study, have sufficient knowledge and ability to continue to study relevant specialized graduate training programs for personal and career development.

Program objective 3 (PO3): Being able to participate in the socio-economic development of the country in the globalization period, adapting well in a multicultural and integrated environment thanks to good communication and computer skills; Contributing to Vietnam's international integration through technical consulting and chemical engineering technology transfer to the community, changing the way of thinking and production methods of Vietnamese people in the direction of chemical technology. green learning, contributing to environmental protection.

1.2. Expected Learning Outcome (ELO)

Upon completion of the training program, students have the following knowledge, skills, attitude:

Content	Expected Learning Outcome (ELO)
General knowledge	ELO1: Apply knowledge of natural sciences, politics, society, humanities, law, economics and understanding of contemporary issues to Chemical Engineering Technology.
	ELO2: Analysis of composition, structure and content of chemical substances in the environment and natural compounds.

Professional knowledge	ELO3: Evaluation of chemical properties and biological activities of substances
	ELO4: Develop a research plan on the potential for exploitation and use of natural compounds
	ELO5: Design process for synthesis, extraction and production of chemical materials to treat environmental pollution and use in food technology according to national and international standards and regulations.
General skills	ELO 6: Applying systematic thinking, critical thinking and creative thinking in solving problems of chemical engineering technology.
	ELO7: Teamwork and cross-functional team leadership.
	ELO8: Communicate effectively orally, in writing, and in multimedia with stakeholders in diverse environments; meet English standards as prescribed by the Ministry of Education and Training.
Professional skills	ELO9: Apply appropriate approaches and methods and techniques to investigate, survey and research issues of chemical engineering technology.
	ELO10: Design and operate production technology processes related to analysis, synthesis, extraction and production of chemical materials such as: cosmetic chemicals, flavoring chemicals, plastics, composites, fertilizers ... and environmental pollution treatment materials.
Attitude	ELO11: Figure out a clear future orientation, passion for career and a sense of lifelong learning.
	ELO12: Demonstrating professional ethical standards, fulfilling responsibilities to protect the environment, and protect people's health.

II. CAREER ORIENTATION AFTER Graduation

Graduates from the field of Chemical Engineering Technology, students can work in the following fields:

- + Research staff, experts at institutes, centers, state management agencies
- + Working in companies, factories, production enterprises, business establishments related to the Chemistry industry

- + Teaching Chemistry at Universities, Colleges, Vocational Schools and High Schools
- + Working as a manager in chemical manufacturing and trading companies, chemical equipment.

III. ORIENTATION FOR ADVANCED LEARNING AFTER GRADUATION

Graduates students from the field of Chemical Engineering Technology can participate in domestic and foreign graduate training programs in majors such as:

- + Master program in Chemical engineering technology
- + Master program in Chemistry;
- + Master program in Environmental science;
- + Master program in Environmental engineering technology.
- + Doctor program in Chemical engineering technology
- + Doctor program in Chemistry;
- + Doctor program in Environmental science.

IV. PROGRAM CONTENT (NAME AND VOLUME OF MODULES):

No	Year Code	Code	English name	Total	Theory	Practice	Previous Course	Code	Compulsory
I.1.	TOTAL GENERAL COURSES			40	36,5	3,5			36
1	1	ML01020	Marxism and Leninism Philosophy	3	3	0			X
2	1	ML01021	Marxism and Leninism Political Economy	2	2	0			X
3	2	ML01022	Scientific socialism	2	2	0			X
4	2	ML01005	Ho Chi Minh ideology	2	2	0			X
5	3	ML01023	Vietnamese Communist Party History	2	2	0			X
6	2	SN01032	English 1	3	3	0			X
7	2	SN01033	English 2	3	3	0	English 1	SN01032	X
8	1	TH01009	General Informatics	2	1,5	0,5			X
9	1	ML01009	Introduction to laws	2	2	0			X
10	1	MT01001	General Chemistry	2	1,5	0,5			X
11	1	TH01011	Higher mathematics	3	3	0			X
12	1	TH01007	Probability and Statistics	3	3	0			X
13	1	TH01002	General Physics A	3	2	1			X
14	1	SH01001	General Biology	2	1,5	0,5			X
16	2	CP02005	General biochemistry	2	1,5	0,5			X

No	Year Code	Code	English name	Total	Theory	Practice	Previous Course	Code	Compulsory
15	1	MT02033	General Microbiology	2	1,5	0,5			
17	1	RQ02003	Macro and micro economic principles	2	2	0			
18	2	ML01007	General Sociology	2	2	0			
19	2	MT02043	General Meteorology	2	1,5	0,5			
II.	TOTAL BASED MAJOR COURSES			22	18	4			18
20	2	MT02008	Chemical engineering	2	2	0	General Chemistry	MT01001	X
21	1	MT02009	Inorganic chemistry	3	3	0			X
22	1	MT02010	Inorganic chemistry Lab	1	0	1			X
23	1	MT02013	Organic chemistry	3	3	0			X
24	2	MT02018	Organic chemistry Lab	1	0	1	Organic chemistry	MT02013	X
25	2	MT02019	Analytical chemistry	3	3	0			X
26	2	MT02020	Analytical chemistry Lab	1	0	1	Analytical chemistry	MT02019	X
27	1	MT02021	Physical chemistry	3	3	0			X
28	2	MT02022	Physical chemistry Lab	1	0	1			X
29	2	CD02505	Environmental and Safety Engineering	2	2	0			
30	2	CD02157	Technical drawing	2	2	0			
31	2	MT02005	Basic productions	2	2	0			
32	2	MT02038	Environment and human	2	2	0			
III.	TOTAL MAJOR COURSES			20	17	3			16

No	Year Code	Code	English name	Total	Theory	Practice	Previous Course	Code	Compulsory
33	3	SN03098	Specialized English for Chemical Engineering major	2	2	0	English 2	SN01033	X
34	2	CP03059	Applied Biochemistry	2	2	0			X
35	2	MT03031	Environmental Chemistry	3	3	0	General Chemistry	MT01001	X
36	3	MT03032	Environmental Chemistry Lab	1	0	1			X
37	3	MT03033	Modern Analyses	3	3	0	Analytical chemistry	MT02019	X
38	4	MT03038	Modern Analysis Lab	1	0	1	Modern Analyses	MT03033	X
39	2	MT03034	Processes and equipment in chemical engineering	3	3	0	Chemical engineering	MT02008	X
40	2	MT03035	Processes and equipment in chemical engineering Laboratory	1	0	1	Processes and equipment in chemical engineering	MT03034	X
41	3	MT03036	Chemical Experiment Design and Data Analysis	2	2	0			
42	2	MT03022	Climate change	2	1,5	0,5	General Meteorology	MT02043	
43	3	RQ01007	Applied Informatics	2	2	0			
44	3	MT03037	Green chemistry	2	2	0			
45	2	MT01003	Colloidal chemistry	2	2	0	General Chemistry	MT01001	
III.1.	ENVIRONMENTAL CHEMICAL MODULE			47	16,5	31,5			43

No	Year Code	Code	English name	Total	Theory	Practice	Previous Course	Code	Compulsory
46	3	MT02001	Environmental pollution	2	2	0			X
47	4	MT03005	Environmental toxicology	2	2	0	Environmental Chemistry	MT03031	X
48	3	MT03040	Modeling the fate and transport of pollutants in the environment	2	1	1			X
49	3	MT03039	Sample collection and handling techniques	2	2	0			X
50	3	MT03013	Air Pollutant and Solid Waste Treatment Engineering	3	3	0	Environmental Chemistry	MT03031	X
51	3	MT03003	Wastewater treatment Engineering	2	2	0	Environmental Chemistry	MT03031	X
52	4	MT03014	Waste treatment Engineering: practice	2	0	2			
53	3	MT03046	Recycling and Resource Recovery Engineering	2	2	0			
54	3	MT03019	Environmental Risk Assessment	2	2	0			
55	4	MT03041	Applied nanotechnology in contaminant treatment	2	2	0			
56	3	MT03030	Chemical residues in the environment	2	2	0			
57	3	MT04003	Environmental Chemistry Project	8	0	8			X

No	Year Code	Code	English name	Total	Theory	Practice	Previous Course	Code	Compulsory
58	4	MT04004	Environmental Chemistry Internship	12	0	12	Environmental Chemistry Project	MT04003	X
59	4	MT04996	Graduate Diploma in Environmental Chemistry	10	0	10	Environmental Chemistry Internship	MT04004	X
III.2.	SPECIALIZED MODULE OF NATURAL COMPOSITION CHEMISTRY			47	16	32			43
60	3	MT03042	Chemistry of natural compounds	3	3	0	Organic chemistry	MT02013	X
61	3	MT03045	Methods for determining the structure of organic compounds	2	2	0	Organic chemistry	MT02013	X
62	3	CP02004	Food chemistry	3	2	1	Organic chemistry	MT02013	X
63	4	MT03044	Aromas and cosmetics technology	2	1,5	0,5	Organic chemistry		X
64	3	MT03055	Heterocyclic Compounds	2	2	0			X
65	4	CP03030	Functional Food	2	2	0			
66	3	MT03047	Substance separation and purification	2	1,5	0,5	Modern Analyses		
67	3	MT03043	Pharmaceutical Chemistry	2	2	0	Organic chemistry	MT02013	X

No	Year Code	Code	English name	Total	Theory	Practice	Previous Course	Code	Compulsory
68	3	MT03049	Pharmacognosy	2	2	0			
69	3	NH03016	General medicinal plants	2	1,5	0,5			
70	3	MT03048	Polymer chemistry and engineering	2	2	0	Organic chemistry	MT02013	
71	3	MT04005	Chemistry of natural compounds Project	8	0	8	Chemistry of natural compounds	MT03042	X
72	4	MT04006	Chemistry of natural compounds Internship	12	0	12	Chemistry of natural compounds	MT03042	X
73	4	MT04997	Graduation thesis majoring in Chemistry of Natural Compounds	10	0	10			X
			10 elective credits instead of a thesis	10	9,5	0,5			
74	2	QL03048	Chemicals application in Agriculture and Environment	2	2	0			
75	4	MT03052	Analysis of chemical contaminants and residues in food	2	2	0	Cơ sở hóa phân tích	MT02019	
76	4	MT03053	Reaction techniques	2	2	0	Processes and equipment in chemical engineering	MT03034	
77	4	MT03058	Biotechnology for environmental treatment	2	2	0	General Microbiology	MT02033	

No	Year Code	Code	English name	Total	Theory	Practice	Previous Course	Code	Compulsory
78	4	MT03054	Technology for manufacturing cleaning products	2	1,5	0,5			

