

ACADEMIC TRAINING PROGRAM

(Issued under Decision No: 2551/QĐ-DCT dated 19/08/2024 by the Rector of Ho Chi Minh City University of Industry and Trade)

Program Name (Vietnamese): KỸ THUẬT NHIỆT

Program Name (English): Thermal Engineering

Degree Level: Bachelor's degree (Undergraduate)

Field of Study: Thermal Engineering

Program Code: 7520115

Discipline Group: Engineering

Mode of Study: Full-time

Quality Assurance Information: This program was developed in accordance with the accreditation standards for educational programs issued by the Minister of Education and Training (MOET) in 2019, with the objective of undergoing external assessment.

1. Training Objectives

1.1. General Objective

The Thermal Engineering program is developed based on the vision and mission of the Industrial University of Ho Chi Minh City and the Faculty of Mechanical Engineering. It aims to train Thermal Engineering graduates with strong character, professional knowledge to solve thermal engineering problems, along with the skills, attitudes, and health required to meet practical demands and the country's long-term development plans in the field of thermal engineering.

1.2. Specific Objectives

- **a. Knowledge:** Equip students with fundamental knowledge of natural sciences, serving as a foundation for professional education and advanced studies. Provide specialized knowledge necessary for analyzing, evaluating, designing, manufacturing, operating, maintaining, troubleshooting, and researching products in the thermal engineering field.

- **b. Skills:** Equip students with skills in information processing, data analysis, problem-solving, teamwork, foreign languages, and professional communication.
- **c. Autonomy and Responsibility:** Foster awareness of responsibility toward oneself and society, cultivate professional ethics, and develop a mindset for lifelong learning to support future career growth.

2. Program Learning Outcomes (PLOs)

Upon completion of the program, learners will possess the following knowledge, skills, and professional practical competencies:

2.1. Learning Outcomes Table

Code	Program Learning Outcomes	Bachelor Proficiency Level	Engineer Proficiency Level
a	Knowledge		
PLO1	Apply fundamental knowledge of science and social sciences (including mathematics, IT, political theory, law, and management) in the engineering field to meet professional and life requirements.	C3	C3
PLO2	Analyze solid practical knowledge and broad theoretical knowledge to evaluate issues in fields related to thermal engineering.	C4	-
	Synthesize deep and broad practical and theoretical knowledge; master the principles of a system to evaluate issues in fields related to thermal engineering.	-	C5
b	Skills and Personal Attributes		
PLO3	Proficiently execute necessary skills to solve problems in the thermal field.	P3	-
	Masterfully perform skills of analysis, synthesis, and evaluation of data/information to provide scientific solutions for thermal system issues.	-	P4

Code	Program Learning Outcomes	Bachelor Proficiency Level	Engineer Proficiency Level
PLO4	Proficiently execute self-learning, research, and knowledge exploration skills to update innovations and build lifelong learning plans for thermal systems.	P3	P3
PLO5	Demonstrate personal qualities, professional ethics, and responsibility (honesty, integrity, sense of discipline) in work and life.	A3	A3
c	Interaction Skills		
PLO6	Proficiently execute cooperation, organization, and teamwork skills in professional activities related to the thermal field and life.	P3	P3
PLO7	Masterfully perform communication and information exchange skills, including the use of foreign languages for professional thermal activities and life.	P4	P4
d	Professional Practice Competency (Autonomy)		
PLO8	Analyze social and business contexts, demonstrate self-orientation, and apply knowledge to provide professional conclusions in specific situations to meet social/business needs or for entrepreneurship.	R4	R4
PLO9	Proficiently execute planning, coordination, evaluation, and efficiency improvement of professional activities in the thermal field.	P3	-
	Masterfully perform the organization, management, and improvement of professional thermal engineering activities.	-	P4

Note on Proficiency Levels (MĐNL):

- **Knowledge:** Bloom's Taxonomy - Cognitive domain (C1-C6).
 - **Behavioral Skills:** Bloom's Taxonomy - Psychomotor domain (P1-P5).
 - **Emotional/Attitude Skills:** Bloom's Taxonomy - Affective domain (A1-A5).
 - **Competency Level:** Crawley-Proficiency Rating scale (R1-R5).
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Key Notes & Terminology:

- (*) **Core Modules:** These are mandatory units including Internships and Graduation Projects.
- **Taxonomy Scales:**
 - **C (Cognitive):** Knowledge levels (Bloom's).
 - **P (Psychomotor):** Behavioral/Action skills.
 - **A (Affective):** Emotional/Attitude skills.
 - **R (Crawley):** Proficiency/Competency rating.
- **3. Academic Workload**

No.	Knowledge Block	Credits	Percentage
1	General Education	30	19.8%
2	Fundamental Major Knowledge	36	23.8%
3	Specialized Major Knowledge (including Internship/Enterprise Semester in Semester 7)	55	36.6%
4	Specific Advanced Knowledge	30	19.8%
	Total Cumulative Credits	151	100%

11. Training Program Content

No.	Course Code	Internal Code	Course Title	Credits	Conditions (Pre-requisite (a); Corequisite (b); Parallel (c))
I	General Knowledge			30	
	Compulsory General Knowledge			26	
1	0101100651	11200001	Marxist - Leninist Philosophy	3(3,0)	
2	0101002298	11200002	Marxist - Leninist Political Economy	2(2,0)	(a) 0101100651
3	0101000476	11200003	Scientific Socialism	2(2,0)	(a) 0101100651
4	0101001625	11200004	History of the Communist Party of Vietnam	2(2,0)	(a) 0101100651
5	0101006322	11200005	Ho Chi Minh Ideology	2(2,0)	(a) 0101100651
6	0101102246	14202001	General English 1	2(1,1)	

No.	Course Code	Internal Code	Course Title	Credits	Conditions (Pre-requisite (a); Corequisite (b); Parallel (c))
7	0101102247	14202002	General English 2	2(1,1)	(a) 0101102246
8	0101102248	14202003	General English 3	2(1,1)	(a) 0101102247
9	0101003671	11200006	Introduction to Laws	2(2,0)	
10	(Various)	16201001	Physical Education 1	2(0,2)	
11	(Various)	16201002	Physical Education 2	2(0,2)	(a) Codes from PE 1
12	(Various)	16201003	Physical Education 3	2(0,2)	(a) Codes from PE 2
13	0101001657	17200004	National Defense & Security Education 1	3(3,0)	(c) 14, 15, 16
14	0101001662	17300004	National Defense & Security Education 2	2(2,0)	(c) 13, 15, 16
15	0101001669	17301005	National Defense & Security Education 3	1(0,1)	(c) 13, 14, 16

No.	Course Code	Internal Code	Course Title	Credits	Conditions (Pre-requisite (a); Corequisite (b); Parallel (c))
16	0101001677	17221002	National Defense & Security Education 4	2(0,2)	(c) 13, 14, 15
17	0101006144	15200001	Advanced Mathematics A1 (Calculus 1)	3(3,0)	
18	0101100816	15200019	General Physics	2(2,0)	
19	0101006150	15200002	Advanced Mathematics A2 (Calculus 2)	2(2,0)	
	Elective General Knowledge			4	
	Group A (Choose at least 1 course)			2	
20	0101002400	07200444	Communication Skills	2(2,0)	
21	0101101638	03200446	Critical Thinking	2(2,0)	
22	0101003731	15200023	Scientific Research Methodology	2(2,0)	

No.	Course Code	Internal Code	Course Title	Credits	Conditions (Pre-requisite (a); Corequisite (b); Parallel (c))
23	0101100936	17200001	Innovation and Entrepreneurship	2(2,0)	
	Group B (Choose at least 1 course)			2	
24	0101100802	15200021	Engineering Physics	2(2,0)	
25	0101102249	15200033	Probability and Statistics	2(2,0)	
26	0101004035	15200007	Linear Programming	2(2,0)	
II	Fundamental Knowledge			36	
	Compulsory Fundamental Knowledge			34	
27	0101101640	03200400	Introduction to Thermal Engineering	2(2,0)	
28	0101102134	03202550	Technical Drawing	2(1,1)	

No.	Course Code	Internal Code	Course Title	Credits	Conditions (Pre-requisite (a); Corequisite (b); Parallel (c))
29	0101103064	03202606	Mechanical Drawing	2(1,1)	(a) 0101102134
30	0101000260	03201402	AutoCAD	2(0,2)	
31	0101002497	02200032	Electrical Engineering	2(2,0)	
32	0101000587	03200005	Theoretical Mechanics	2(2,0)	
33	0101004143	03200007	Strength of Materials	3(3,0)	
34	0101003477	03200406	Engineering Thermodynamics	3(3,0)	
35	0101101642	03201407	Engineering Thermodynamics Experiments	1(0,1)	(a) 0101003477
36	0101102612	03200555	Fluid Mechanics	3(3,0)	
37	0101006267	03200452	Heat Transfer	2(2,0)	
38	0101004580	03200083	Heat Exchangers	2(2,0)	(a) 0101006267

No.	Course Code	Internal Code	Course Title	Credits	Conditions (Pre-requisite (a); Corequisite (b); Parallel (c))
39	0101101711	03201410	Heat Transfer Experiments	1(0,1)	(a) 0101006267
40	0101101645	03200411	Thermal and Refrigeration Engineering Materials	2(2,0)	
41	0101100937	03200025	Pumps – Fans – Compressors	2(2,0)	
42	0101002574	03200415	Fundamentals of Refrigeration Engineering	2(2,0)	
43	0101101646	03201412	Pumps – Fans – Compressors Experiments	1(0,1)	(a) 0101100937
	Elective Fundamental Knowledge			2	
44	0101004030	15200008	Experimental Planning	2(2,0)	
45	0101007639	03200012	Tolerance and Technical Measurement	2(2,0)	

No.	Course Code	Internal Code	Course Title	Credits	Conditions (Pre-requisite (a); Corequisite (b); Parallel (c))
46	0101101707	03200443	Safety Engineering in Thermal Industry	2(2,0)	
III	Major Knowledge			55	
	Compulsory Major Knowledge			44	
47	0101007638	03200404	Machine Design	3(3,0)	
48	0101102649	03200577	General Mechanical Engineering	3(3,0)	
49	0101100903	03201001	General Mechanical Engineering Practice	2(0,2)	
50	0101102648	03202556	English for Mechanical Engineering	2(1,1)	(a) English 1, 2, 3
51	0101003261	03200106	Refrigeration Machines and Equipment	2(2,0)	(a) 0101002574
52	0101101706	03200442	Applied Refrigeration Engineering	2(2,0)	(a) 0101002574

No.	Course Code	Internal Code	Course Title	Credits	Conditions (Pre-requisite (a); Corequisite (b); Parallel (c))
53	0101102613	03200557	Air Conditioning Engineering	2(2,0)	
54	0101102614	03203558	Project: Refrigeration System Design	1(0,1)	(a) 0101002574
55	0101007637	03201414	Basic Refrigeration Practice	2(0,2)	(c) 0101002574
56	0101102615	03203559	Refrigeration System Operation and Repair Practice	2(0,2)	(a) 55, 42
57	0101102616	03203560	Air Conditioning Installation Practice	2(0,2)	(a) 55, 42
58	0101101684	03200419	Drying Systems	3(3,0)	
59	0101101685	03201420	Drying System Experiments	1(0,1)	(a) 0101101684
60	0101101704	03200010	Thermal Power Plants	2(2,0)	
61	0101101686	03200421	Boilers and Thermal Networks	3(3,0)	

No.	Course Code	Internal Code	Course Title	Credits	Conditions (Pre-requisite (a); Corequisite (b); Parallel (c))
62	0101101647	03200413	Fundamentals of Thermal System Automation	2(2,0)	
63	0101102617	03203561	Graduation Internship	4(0,4)	
64	0101102618	03203562	Graduation Thesis	6(0,6)	(a) 0101102617
	Elective Major Knowledge			11	
	Group C (Choose at least 1)			2	
65	0101101692	03200428	Standards and Codes in Thermal Engineering	2(2,0)	
66	0101101700	03200436	Solidworks Applications in Thermal Engineering	2(0,2)	
67	0101101705	03200441	Energy Project Design and Evaluation	2(2,0)	

No.	Course Code	Internal Code	Course Title	Credits	Conditions (Pre-requisite (a); Corequisite (b); Parallel (c))
	Group D (Choose at least 2 - 1x3Cr & 1x2Cr)			5	
68	0101102619	03200563	Water Supply and Drainage	3(3,0)	
69	0101102620	03200564	Fire Fighting and Prevention	3(3,0)	
70	0101102621	03200565	Gas and Steam Turbines	3(3,0)	
71	0101101697	03200433	Building Electrical Systems	2(2,0)	
72	0101006373	03200424	Refrigeration System Operation and Maintenance	2(0,2)	
73	0101101708	03200444	Air and Refrigerant Transporting Systems	2(2,0)	
	Group E (Choose at least 1)			2	
74	0101101701	03200437	Construction Engineering	2(2,0)	
75	0101102622	03203566	Thermal Measurement	2(2,0)	

No.	Course Code	Internal Code	Course Title	Credits	Conditions (Pre-requisite (a); Corequisite (b); Parallel (c))
76	0101102623	03203567	Thermal Process Automation	2(2,0)	
	Group F (Choose at least 1)			2	
77	0101101641	03200007	Sensors and Actuators	2(2,0)	
78	0101101695	03200431	HVAC Design with Revit MEP	2(0,2)	
79	0101101696	03200432	Heat Pumps and Applications	2(2,0)	
IV	Specialized Knowledge			30	
	Compulsory Specialized Knowledge			25	
80	0101102624	03200568	Renewable Energy	3(3,0)	
81	0101102625	03200569	Software Applications in Air Conditioning Design	2(0,2)	

No.	Course Code	Internal Code	Course Title	Credits	Conditions (Pre-requisite (a); Corequisite (b); Parallel (c))
82	0101102626	03200570	Industrial Ventilation Engineering	2(2,0)	
83	0101102627	03202571	Electrical Equipment for Thermal-Refrigeration Systems	3(2,1)	
84	0101101688	03200423	PLC Applications in Thermal Engineering	3(3,0)	
85	0101101690	03203426	Project: Thermal Supply System Design	1(0,1)	(a) 0101101686
86	0101100926	03204001	Engineering Internship	8(0,8)	
87	0101102628	03203573	Engineering Project/Capstone	3(0,3)	(a) 0101100926
	Elective Specialized Knowledge			5	
88	0101102629	03200574	Simulation of Heat and Mass Transfer	3(3,0)	

No.	Course Code	Internal Code	Course Title	Credits	Conditions (Pre-requisite (a); Corequisite (b); Parallel (c))
89	0101102646	03200595	Industrial Mechatronics Systems	3(3,0)	
90	0101100923	03200044	Smart Manufacturing Systems	3(3,0)	
91	0101102640	03200589	Agriculture and Food Processing Machinery	2(2,0)	
92	0101100911	03201018	Automated Production Systems	2(1,1)	
93	0101102630	03200576	Efficient and Economical Use of Energy	2(2,0)	
Total Theoretical Credits (Excluding PE & National Defense)				94	
Total Practical/Internship/Thesis Credits (Excluding PE & ND)				57	
Total Program Credits (Excluding PE & National Defense)				151	