

MINISTRY OF EDUCATION AND TRAINING
HO CHI MINH CITY UNIVERSITY OF TECHNOLOGY AND EDUCATION

UNDERGRADUATE PROGRAM
Major of
THERMAL ENGINEERING TECHNOLOGY

Issued under Decision No./QĐ-DHSPKT dated
by the Rector of Ho Chi Minh City University of Technology and Education

Applying from the 2025's Promotion

Ho Chi Minh City, 2025

UNDERGRADUATE PROGRAM

Education Program: THERMAL ENGINEERING TECHNOLOGY

Level: Undergraduate

Major: THERMAL ENGINEERING TECHNOLOGY

Major's ID: 7510206

Type of Program: Full time

Graduation Diploma: ENGINEER

(Issued under Decision No...../QĐ-ĐHSPKT dated by the Rector of the Ho Chi Minh City University of Technology and Education)

1. TRAINING DURATION: 4 years

2. ADMISSION REQUIREMENTS: High-school Graduation

3. GRADING SCALE, TRAINING PROCESS AND GRADUATION REQUIREMENTS

Grading Scale: 10

Training Process: According to Decision No. 1727/QĐ-ĐHSPKT dated 06/9/2021 of Ho Chi Minh City University of Technology and Education on promulgating the university-level training regulations.

Graduation Requirements:

General condition: According to Decision No. 1727/QĐ-ĐHSPKT dated 06/9/2021 of Ho Chi Minh City University of Technology and Education on promulgating the university-level training regulations.

Condition of specialty: According to the general regulations of Ho Chi Minh City University of Technology and Education.

4. THE OBJECTIVES AND EXPECTED LEARNING OUTCOMES

Program Goals

To train engineers in Thermal Engineering Technology (TET) with political and ethical qualities; have a comprehensive knowledge of the principles, rules of nature - social science,

general knowledge of science, fundamental knowledge and specialized in thermodynamics, practical skills, ability to work independently, create and solve problems in the field of heating and refrigeration; have the ability to improve their learning; To have health, professional responsibility and adapt to the working environment of organizations and units engaged in the field of heating and refrigeration, meeting the social demands and international integration.

Program Objectives

PO1. Having technical knowledge and reasoning.

PO2. Developing personal and professional skills and attributes.

PO3. Interpersonal skills: teamwork and communication

PO4. Conceiving, designing, implementing, and operating thermal systems to meet social demands.

Program Outcomes

Code	Expected Learning Outcomes	Competence level
ELO1	Ability to calculate and solve technical problems in the field of Thermal Engineering Technology by applying knowledge of natural sciences and engineering.	4
ELO2	Ability to experiment, analyze, synthesize, and evaluate data to draw appropriate conclusions in the field of Thermal Engineering Technology.	4
ELO3	Ability to perceive the ethics and professional responsibilities of an engineer; to propose appropriate solutions in considering the impact of these solutions in a global, economic, environmental and social context.	3
ELO4	Ability to recognize the need for and engage in lifelong learning.	4
ELO5	Ability to work effectively in a team.	3
ELO6	Ability to communicate effectively with a variety of audiences and communicate in English.	4
ELO7	Ability to think, have ideas, and design technical solutions in the field of Thermal Engineering Technology to meet the needs of society.	4
ELO8	Ability to deploy technical systems in the field of Thermal Engineering Technology.	4
ELO9	Ability to operate and manage technical systems in the field of Thermal Engineering Technology.	4

Capacity scale

Competence level		Short description
$0.0 \leq \text{Level} \leq 1.0$	Basic	Remember: Students memorize/ recognize/ recall knowledge by actions such as definition, repetition, listing, identification, identification, ...
$1.0 < \text{Level} \leq 2.0$	Satisfaction	Understand: Students create their own knowledge from documents, knowledge by actions such as explanation, classification, illustration, reasoning, ...
$2.0 < \text{Level} \leq 3.0$		Application: Students implement/ apply knowledge to create products such as models, real objects, simulation products, reports, ...
$3.0 < \text{Level} \leq 4.0$	Proficiency	Analysis: Students analyze materials/ knowledge into details/ parts and indicate their relationships as a whole by actions such as analysis, classification, comparison, synthesis, ...
$4.0 < \text{Level} \leq 5.0$		Assessment: Students make judgments, predictions about knowledge/ information according to standards, criteria and measurement indicators which have been determined by actions such as comments, criticisms, recommendations, ...
$5.0 < \text{Level} \leq 6.0$	Excellent	Creation: Students create/ organize/ organize/ design/ generalize parts/ parts in other/ new ways to create new structures/ models/ products.

5. TOTAL PROGRAM CREDITS: 158 credits

(158 credits are NOT including Physical Education, National Defense Education, and Enterprise Seminar courses)

Foreign Language Knowledge:

- Students with an **IELTS ≥ 5.0** or **equivalent** (as per Decisions No. 2146/QĐ-ĐHSPKT dated 05/8/2024 and No. 2930/QĐ-ĐHSPKT dated 12/10/2020) will be exempted from the English placement test. Their scores will be converted for English courses in the program and English proficiency requirement (Outcome).
- English Placement Test for Level Classification:** Students without IELTS certificate must participate in an English placement test to determine their proficiency level.
 - If a student achieves **Level 1**, they must study **Communicative English 1** and **Communicative English 2**.
 - If a student achieves **Level 2**, they must study **Communicative English 2**.

- **Sequence of English courses:** Communicative English 1 (COEN140135E) → Communicative English 2 (COEN140235E) → Academic English 1 (ACEN340535E) → Academic English 2 (ACEN340635E) → English for Thesis Writing (ENTW621038E).

Note:

- **Communicative English 1** and **Communicative English 2** are supplementary courses designed to enhance English communication skills for students, not accumulating credits in the program.
- **Academic English 1** and **Academic English 2** are academic courses that accumulate credits in the program.

6. ALLOCATION OF KNOWLEDGE GROUP

Name of Knowledge Group	Credits		
	Total	Compulsion	Option
General Knowledge	59	49	10
General Politics + Laws	14	14	0
Social Sciences and Humanities	4	0	4
English	8	8	0
Mathematics and Natural Sciences	28	22	6
Technical Computer Sciences	2	2	0
Introduction to Thermal Engineering Technology	3	3	0
Professional knowledge	99	87	12
Foundation of Major	30	26	4
Professional Major	36	34	2
Interdisciplinary	6	0	6
Enterprise seminar (Non-accumulation)	0(1)	0(1)	0
Practices	15	15	0
Internship	2	2	0
Capstone project	10	10	0
Physical Education (Non-accumulation)	0(3)	0(3)	
National Defense Education (Non-accumulation)	0(4)	0(4)	
Total	158	136	22

7. CONTENT OF PROGRAM

7.1. Compulsory Courses: General Knowledge

No.	Course code	Course name	Credits	Prerequisite
General Politics + Laws			14	
1.	LLCT130105E	Philosophy of Marxism and Leninism	3	
2.	LLCT120205E	Political Economics of Marxism and Leninism	2	
3.	LLCT120405E	Scientific Socialism	2	
4.	LLCT220514E	History of Vietnamese Communist Party	2	
5.	LLCT120314E	Ho Chi Minh's Ideology	2	
6.	GELA236939E	General Law	3	
English			8	
7.	ACEN340535E	Academic English 1	4	
8.	ACEN340635E	Academic English 2	4	
Mathematics and Natural Sciences			22	
9.	MATH132401E	Calculus 1	3	
10.	MATH132501E	Calculus 2	3	
11.	MATH132601E	Calculus 3	3	
12.	MATH132901E	Mathematical Statistics for Engineers	3	
13.	PHYS130902E	Physics 1	3	
14.	PHYS131002E	Physics 2	3	
15.	PHYS111202E	Physics - Laboratory 1	1	
16.	GCHE130603E	General Chemistry for Engineers	3	
Technical Computer Science			2	
17.	IPRM121585E	Matlab Programming Language	2	
Introduction to Thermal Engineering Technology			3	
18.	INTE130132E	Introduction to Thermal Engineering Technology	3	
Physical Education (Non-accumulation)			0(3)	
19.	PHED110130	Giáo dục thể chất 1 (<i>Physical Education 1</i>)	0(1)	Select 2 from 10 courses below
20.		Giáo dục thể chất 2 (<i>Physical Education 2</i>)	0(1)	
21.		Giáo dục thể chất 3 (<i>Physical Education 3</i>)	0(1)	

	FOOT112330	Bóng đá (<i>Football</i>)	0(1)	Select 2 courses for Physical Education 2 and Physical Education 3
	VOLL112330	Bóng chuyền (<i>Volleyball</i>)	0(1)	
	BASK112330	Bóng rổ (<i>Basketball</i>)	0(1)	
	BADM112330	Cầu lông (<i>Badminton</i>)	0(1)	
	TENN112330	Quần vợt (<i>Tennis</i>)	0(1)	
	KARA112330	Không thủ đạo (<i>Karate</i>)	0(1)	
	CHES112330	Cờ vua (<i>Chess</i>)	0(1)	
	CHIN112330	Cờ tướng (<i>Chinese Chess</i>)	0(1)	
	YOGA112330	Yoga (<i>Yoga</i>)	0(1)	
	PICK112330	Pickle ball	0(1)	
National Defense Education (Non-accumulation)			0(4)	
22.	GDQP110131	Giáo dục quốc phòng 1 (<i>National Defense Education 1</i>)	0(1)	
23.	GDQP110231	Giáo dục quốc phòng 2 (<i>National Defense Education 2</i>)	0(1)	
24.	GDQP110331	Giáo dục quốc phòng 3 (<i>National Defense Education 3</i>)	0(1)	
25.	GDQP110431	Giáo dục quốc phòng 4 (<i>National Defense Education 4</i>)	0(1)	
Total			49	

7.2. Compulsory Courses: Professional knowledge

7.2.1 Foundation of major

No.	Course code	Course name	Credits	Prerequisite
1.	THME230721E	Theoretical Mechanics	3	
2.	STMA230521E	Strength of Materials	3	THME230721E
3.	TEDG130120E	Technical drawing - Basic course	3	
4.	MMCD230323E	Mechanisms and Machine Components Design	3	
5.	EEEN234062E	Electrical and Electronic Engineering	3	
6.	FLUI230132E	Applied Fluid Mechanics	3	
7.	THER230232E	Thermodynamics	3	
8.	HEAT230332E	Heat Transfer	3	

9.	ENTW621038E	English for thesis writing	2	
Total			26	

7.2.2 Professional Major Courses

No.	Course code	Course name	Credits	Prerequisite
Theory and Laboratory Courses			34	
1.	REEN240532E	Refrigeration Engineering	4	
2.	BOIT330632E	Steam Boiler	3	
3.	PFCO330232E	Pumps, Fans, and Compressors	3	
4.	COMP340732E	Compressors and Refrigeration Equipments	4	
5.	ACSY340932E	Air Conditioning Systems	4	
6.	THPP341032E	Thermal Power Plants	4	
7.	DRYT331132E	Drying Technology and Distillation	3	
8.	DSME443632E	Design Software in ME	4	
9.	PTPA331632E	Principles of Thermal Process Automation	3	
10.	REPR310132E	Refrigeration Technology Projects	1	
11.	THPR310232E	Thermal Project	1	
Practice Courses			15	
12.	RETP322132E	Practice of Refrigeration Technology 1	2	
13.	RETP332232E	Practice of Refrigeration Technology 2	3	
14.	RETP332332E	Practice of Refrigeration Technology 3	3	
15.	RETP332432E	Practice of Refrigeration Technology 4	3	
16.	BOIP322732E	Boiler Practice	2	
17.	DRYP322932E	Drying Practice	2	
Enterprise Seminar Courses (Non-accumulation)			0(1)	
18.	SEMI310026E	Enterprise Seminar - TET	0(1)	
Internship Courses			2	
19.	UNPR423032E	Undergraduate Internship	2	
Thesis Courses			10	
20.	UNTH402832E	Undergraduate Thesis	10	
Total			61	

7.3. Optional Courses: General Knowledge (10 credits)

No.	Course code	Course name	Credits	Prerequisite
Social Science and Humanities			4	
1.	GEFC220105E	General Economics	2	Select 2 in 13 courses
2.	IQMA220205E	Introduction to Quality Management	2	
3.	INMA220305E	Introduction of Management	2	
4.	INLO220405E	Introduction to Logics	2	
5.	IVNC320905E	Introduction to Vietnamese Culture	2	
6.	INSO321005E	Introductory Sociology	2	
7.	ENPS220591E	Engineering Psychology	2	
8.	SYTH220491E	Systems Thinking	2	
9.	LESK120190E	Learning Skills	2	
10.	PLSK120290E	Planning Skills	2	
11.	WOPS120390E	Workplace Skills	2	
12.	REME320690E	Research Methods	2	
13.	BPLA121808E	Business Plan	2	
Mathematics and Natural Sciences			6	
14.	MATH133101E	Higher Mathematics for Engineers 1	3	Select 2 in 4 courses
15.	MATH133201E	Higher Mathematics for Engineers 2	3	
16.	MATH133501E	Linear Algebra and Algebraic Structures	3	
17.	PHYS131102E	Physics 3	3	
18.	AMTE233532	Applied Mathematics- TET	3	
Total			10	

7.4. Optional Courses: Professional knowledge

No.	Course code	Course name	Credits	Prerequisite
Fundamental Courses (select 2 in 5 courses)			4	
1.	THMA221332E	Thermal Materials	2	
2.	METE320126E	Metal Technology	2	
3.	THME221432E	Thermal Measurements	2	
4.	PHEQ220332E	Hydraulic Technology and Air Compress	2	

5.	AMIC320133E	Applied Microcontroller	2	Select 8 credits from 10 courses
Specialized Courses			2	
6.	HEEX321532E	Heat Exchangers	2	
7.	ENEC320832E	Energy Economics	2	
8.	STRT321732E	Special Topics in Refrigeration Technology	2	
9.	STHT321832E	Special Topics in Heat Technology	2	
10.	STRE321932E	Special Topics in Renewable Energy	2	
Multidisciplinary Courses			6	
11.	HEEX321532E	Heat Exchangers	2	
12.	ENEC320832E	Energy Economics	2	
13.	STRT321732E	Special Topics in Refrigeration Technology	2	
14.	STHT321832E	Special Topics in Heat Technology	2	
15.	STRE321932E	Special Topics in Renewable Energy	2	
16.	IMAS320525E	Maintenance in Industry	2	
17.	AUMP323525E	Automation of the Production Process	2	
18.	ENAE321845E	Energy Audit and Efficiency	2	
19.	ERMA326032E	Energy Source and Energy Management	2	
20.	INPY131685E	Introduction to Python Programming	3(2+1)	
Total			12	

7.5. Massive Open Online Courses

To meet with the advanced training programs, students may choose the online courses proposed in the following table for equivalence to the courses offered in the program:

No.	Course code	Course title	Credits	Link to an equivalent course
1.	INTE130132E	Introduction to Thermal Engineering Technology	3	ASU, 2 credits, 16 weeks, https://gfa.asu.edu/courses/online-engineering-course
2.	ERMA326032E	Energy Source and Energy Management	2	ASU, 4 credits, 8 weeks, https://gfa.asu.edu/courses/introduction-solar-systems-astronomy
3.	THER230232E	Thermodynamics	3	University of Michigan, 8 weeks, https://www.mooc-list.com/course/introduction-

				thermodynamics-transferring-energy-here-there-coursera
4.	FLUI230132E	Applied Fluid Mechanics	3	https://www.mooc-list.com/course/fluid-mechanics-saylororg
5.	STRE321932E	Special Topics in Renewable Energy	2	https://www.mooc-list.com/course/wind-waves-and-tides-alternative-energy-systems-coursera

8. CURRICULUM

1st Semester

No.	Course ID	Course Title	Credits		Prerequisite
			Term 1	Term 2	
1	INTE130132E	Introduction to Thermal Engineering Technology	3		
2	MATH132401E	Calculus 1		3	
3	PHYS130902E	Physics 1		3	
4	PHYS111202E	Physics - Laboratory 1		1	
5	GCHE130603E	General Chemistry for Engineers		3	
6	ACEN340535E	Academic English 1	4		
7	IPRM121585E	Matlab Programming Language		2	
8	GELA236939E	General Law	3		
9	PHED110130	Giáo dục thể chất 1 (<i>Physical Education 1</i>)	0(1)		
Total			10(11)	12	
			22 (23)		

2nd Semester

No.	Course ID	Course Title	Credits		Prerequisite
			Term 1	Term 2	
1	LLCT130105E	Philosophy of Marxism and Leninism	3		
2	LLCT120205E	Political Economics of Marxism and Leninism		2	
3	ACEN340635E	Academic English 2	4		
4	MATH132501E	Calculus 2	3		
5	MATH132901E	Mathematical Statistics for Engineers		3	
6	PHYS131002E	Physics 2		3	
7	THME230721E	Theoretical Mechanics		3	
8		Giáo dục thể chất 2 (<i>Physical Education 2</i>)	0(1)		
9	GDQP110131	Giáo dục quốc phòng 1 (<i>National Defense Education 1</i>)		0(1)	
10	GDQP110231	Giáo dục quốc phòng 2 (<i>National Defense Education 2</i>)		0(1)	
	GDQP110331	Giáo dục quốc phòng 3 (<i>National Defense Education 3</i>)			0(1), in Summer Semester
	GDQP110431	Giáo dục quốc phòng 4 (<i>National Defense Education 4</i>)			0(1), in Summer Semester
Total			10(11)	11(13)	
			21 (24)		

3rd Semester

No.	Course ID	Course Title	Credits		Prerequisite
			Term 1	Term 2	
1	LLCT120405E	Scientific Socialism	2		

2	LLCT120314E	Ho Chi Minh's Ideology		2	
3	MATH132601E	Calculus 3	3		
4	THER230232E	Thermodynamics		3	
5	STMA230521E	Strength of Materials	3		THME230721E
6	TEDG130120E	Technical drawing - Basic course		3	
7		<i>Fundamental Course 1</i>	2		
8		<i>Mathematics and Natural Sciences 1</i>		3	
9		Giáo dục thể chất 3 (<i>Physical Education 3</i>)	0(1)		
Total			10(11)	11	
			21 (22)		

4th Semester

No.	Course ID	Course Title	Credits		Prerequisite
			Term 1	Term 2	
1	LLCT220514E	History of Vietnamese Communist Party	2		
2	HEAT230332E	Heat Transfer	3		
3	FLUI230132E	Applied Fluid Mechanics		3	
4	EEEN234062E	Electrical and Electronic Engineering		3	
5	MMCD230323E	Mechanisms and Machine Components Design	3		
6		Fundamental Course 2	2		
7		Mathematics and Natural Sciences 2		3	
8		Social Sciences and Humanities 1	2		
9		Social Sciences and Humanities 2		2	
Total			12	11	
			23		

5th Semester

No.	Course ID	Course Title	Credits		Prerequisite
			Term 1	Term 2	
1	REEN240532E	Refrigeration Engineering	4		
2	PFCO330232E	Pumps, Fans, and Compressors	3		
3	COMP340732E	Compressors and Refrigeration Equipments		4	
4	DRYT331132E	Drying Technology and Distillation	3		
5	PTPA331632E	Principles of Thermal Process Automation		3	
6		<i>Specialized Course</i>	2		
7		<i>Multidisciplinary I</i>		2	
8	ENTW621038E	English for thesis writing		2	
Total			12	11	
			23		

6th Semester

No.	Course ID	Course Title	Credits		Prerequisite
			Term 1	Term 2	
1	RETP322132E	Practice of Refrigeration Technology 1	2		
2	RETP332232E	Practice of Refrigeration Technology 2	3		
3	RETP332332E	Practice of Refrigeration Technology 3	3		
4	DSME443632E	Design Software in ME		4	
5	REPR310132E	Refrigeration Technology Projects	1		
6	ACSY340932E	Air Conditioning Systems		4	
7	BOIT330632E	Steam Boiler		3	

8		Multidisciplinary 2	2		
Total			11	11	
			22		

7th Semester

No.	Course ID	Course Title	Credits		Prerequisite
			Term 1	Term 2	
1	BOIP322732E	Boiler Practice	2		
2	DRYP322932E	Drying Practice	2		
3	RETP332432E	Practice of Refrigeration Technology 4	3		
4	THPR310232E	Thermal Project		1	
5	THPP341032E	Thermal Power Plants	4		
6		Multidisciplinary 3	2		
7	SEMI310026E	Enterprise Seminar - TET		0(1)	
8	UNPR423032E	Undergraduate Internship		2	
Total			13	3(4)	
			16 (17)		

8th Semester

No.	Course ID	Course Title	Credits		Prerequisite
			Term 1	Term 2	
1	UNTH402832E	Undergraduate Thesis		10	
Total			0	10	
			10		

9. COURSE DESCRIPTIONS

9.1. General knowledge

Philosophy of Marxism and Leninism

Credits: 3

Learning Time Allocation: 3/0/6

Prerequisite Courses: None

Prior Courses: None

Course Summary: This course provides a brief introduction to Marxism-Leninism and general concepts related to the subject. It covers the fundamental principles of the Marxist-Leninist worldview and philosophical methodology.

Political economics of Marxism and Leninism

Credits: 2

Learning Time Allocation: 2/0/4

Prerequisite Courses: None

Prior Courses: None

Course Summary: This course focuses on the economic theories of Marxism-Leninism, particularly on the capitalist mode of production.

Scientific Socialism

Credits: 2

Learning Time Allocation: 2/0/4

Prerequisite Courses: Political economics of Marxism and Leninism, Philosophy of Marxism-Leninism

Prior Courses: None

Course Summary: This course covers fundamental theoretical aspects of Marxism-Leninism on socialism, including the concept of scientific socialism, real-world socialism, and its future prospects.

History of Vietnamese Communist Party

Credits: 2

Learning Time Allocation: 2/0/4

Prerequisite Courses: Scientific Socialism

Prior Courses: None

Course Summary: This course provides fundamental knowledge of the formation and development of the Communist Party of Vietnam. It systematically covers the Party's policies, especially during the renovation period, across key areas of society. Topics include the establishment of the Communist Party of Vietnam, its first political platform, policies during the struggle for independence (1930-1945), resistance wars against French colonialists and American imperialists

(1945-1975), industrialization strategies, socialist-oriented market economy development, political system building, cultural policies, social issues, and foreign relations.

Ho Chi Minh's Ideology

Credits: 2

Learning Time Allocation: 2/0/4

Prerequisite Courses: History of Vietnamese Communist Party

Prior Courses: None

Course Summary: In addition to the introductory chapter, the course consists of 7 chapters. Chapter I discusses the foundations, formation process, and development of Ho Chi Minh Thought. From Chapter II to Chapter VII, the course covers the core contents of Ho Chi Minh Thought in line with the objectives of the course.

General Law

Credits: 3

Learning Time Allocation: 3/0/6

Prerequisite Courses: None

Prior Courses: None

Course Summary: This course provides basic concepts of fundamental theoretical knowledge about the state and law in general, and socialist law and state in particular. It helps students gain a correct understanding and perspective on the policies of the Party and the laws of the state. Additionally, it equips students with basic knowledge of the legal system in Vietnam and specific branches of law, enhancing their understanding of law to apply in practical life.

Calculus 1

Credits: 3

Learning Time Allocation: 3/0/6

Prerequisite Courses: None

Prior Courses: None

Course Summary: This course covers basic and advanced mathematics knowledge, including set theory: rational numbers, real numbers, complex numbers. Limits: functions, limits of functions, continuous functions. Differential calculus for single-variable functions: derivatives, differentials, Taylor-Maclaurin series, function analysis, curves in polar coordinates. Integral calculus for single-variable functions: indefinite integrals, definite integrals, improper integrals. Series: number series, function series, power series, Taylor-Maclaurin series, Fourier series, Fourier expansion, trigonometric series.

Calculus 2

Credits: 3

Learning Time Allocation: 3/0/6

Prerequisite Courses: None

Prior Courses: Calculus 1

Course Summary: Matrices and determinants: matrices, types of matrices, inverse matrices, determinants, rank of matrices.

Linear systems: linear systems, Cramer's rule, Gaussian elimination, homogeneous systems.

Vector spaces: vector spaces, subspaces, linear independence, linear dependence, bases, dimension, Euclidean spaces.

Diagonalization of matrices and quadratic forms: eigenvalues, eigenvectors, eigenspaces, matrix diagonalization, quadratic forms, canonical form, quadratic surfaces.

Differential calculus for multivariable functions: multivariable functions, partial derivatives, differentials, extrema of multivariable functions, applications of differential calculus in geometry in space.

Calculus 3

Credits: 3

Learning Time Allocation: 3/0/6

Prerequisite Courses: None

Prior Courses: Calculus 1

Course Summary: Multiple integrals: double integrals, applications for calculating areas of flat regions, surface areas, volumes of solids, triple integrals, applications for calculating volumes of solids.

Line integrals: line integrals of type one, applications, line integrals of type two, applications, Green's theorem, conditions for path independence in line integrals.

Surface integrals: surface integrals of type one and type two, Ostrogradsky's theorem, vector fields, flux and divergence, vector form of Ostrogradsky's theorem, Stokes' theorem, circulation and vorticity, vector form of Stokes' theorem.

Mathematical Statistics for Engineers

Credits: 3

Learning Time Allocation: 3/0/6

Prerequisite Courses: None

Prior Courses: Calculus 1, Calculus 2

Course Summary:

Basic concepts in probability theory: Counting rules, combinations, permutations, binomial theorem, trials, events, probability, conditional probability.

Random variables: Random variables, probability distributions of random variables, numerical characteristics of random variables: expectation, variance, mode, median.

Common probability distributions: Binomial distribution, Poisson distribution, normal distribution, Student's t-distribution.

Sampling theory: Concepts of population, random sampling, statistics on samples, sampling methods, sample characteristics, distribution of sample statistics, calculating sample statistics.

Estimation theory: Concepts of estimation, point estimation, interval estimation.

Hypothesis testing: Type I and Type II errors, significance level, hypothesis testing for means, hypothesis testing for proportions, testing equality of two means or two proportions, testing for independence.

Correlation and regression: Two-dimensional random variables, correlation coefficient, sample correlation coefficient, experimental correlation table, experimental regression line.

Physics 1

Credits: 3

Learning Time Allocation: 3/0/6

Prerequisite Courses: None

Prior Courses: None

Course Summary: Mechanics: Kinematics of particles, dynamics of particles, laws of conservation, rigid body motion. Thermodynamics: Molecular kinetic theory, First Law of Thermodynamics, Second Law of Thermodynamics. Electromagnetism: Electric fields, magnetic fields, varying electromagnetic fields.

Physics 2

Credits: 3

Learning Time Allocation: 3/0/6

Prerequisite Courses: Physics 1

Prior Courses: Physics 1

Course Summary:

Einstein's Theory of Relativity: Special relativity, general relativity. Optics: Wave optics and phenomena like interference, diffraction of light, quantum optics and photoelectric, Compton effects. Quantum Physics: de Broglie and Heisenberg hypotheses, Schrödinger's equation and particle motion, quantization of physical quantities.

The course includes practical experiments to help students visualize theoretical phenomena. Experiments include: error calculation theory, determining the moment of inertia of a wheel and frictional force of a bearing, determining the gravitational acceleration using a physical pendulum, determining the molecular heat capacity ratio of a gas, investigating the RLC resonance circuit-measuring RLC with an electronic oscilloscope, studying the properties of diodes and transistors, determining the electron charge-to-mass ratio using the magnetron method, studying laser diffraction through a flat diffraction grating, determining the wavelength of a laser, studying

thermal radiation-verifying the Stefan-Boltzmann law, studying the photoelectric effect - determining Planck's constant.

Physics - Laboratory 1

Credits: 1

Learning Time Allocation: 0/1/ 4

Prerequisite Courses: Physics 1

Prior Courses: Physics 1

Course Summary:

This course consists of 9 experiments covering principles of mechanics, particle dynamics, and rigid body dynamics. It supplements knowledge for students in the technology field at both the associate and undergraduate levels, providing insight into the nature of physical phenomena in nature and validating physical theories learned in the curriculum. It helps future engineers develop skills in observation, conducting experiments, measuring, calculating, analyzing, and processing data.

General Chemistry for Engineers

Credits: 3

Learning Time Allocation: 3/0/6

Prerequisite Courses: None

Course Summary: This course equips students with basic chemistry knowledge, laying the foundation for understanding related scientific and technical fields. It enables students to (i) understand the nature of atoms and molecules, thereby explaining the properties of matter; (ii) develop the ability to solve basic quantitative problems related to thermodynamics, reaction kinetics, chemical equilibrium, solution properties, and electrochemical processes.

This course serves as the foundation for students to acquire essential knowledge of the physical world around them and recognize the connections between chemistry and engineering disciplines. Additionally, this course prepares students for higher education or second-degree university programs.

Matlab Programming Language

Credits: 2

Learning Time Allocation: 1/1/4

Prerequisite Courses: None

Course Summary: The course consists of two main parts: Introduction to Matlab Programming and Problem Solving using Matlab. Part one includes an introduction to expressions, operators, variables, assignments, scalars, vectors, built-in functions, algorithms, user-defined functions, branching instructions, looping instructions, vectorizing code segments, string and array processing, file input and output. Part two includes graphing techniques, matrix representation for linear algebra equations, basic statistics, sets, sorting, indexing, curve fitting, complex numbers,

integration and differentiation. In addition, this course also guides the thinking method and programming style of Matlab.

Introduction to Thermal Engineering Technology

Credits: 3

Course Description: This course will introduce the students to the application of thermal engineering in industrial and commercial areas and enable them to learn about different machines and equipment in the heat and refrigeration workshop. Students will obtain the skills to search and process information and data, as well as the necessary soft skills, such as presentation, writing, active learning, teamwork, communication, etc. Students will also learn about professional development and life-long learning, professional ethics, environmental awareness, and professional working manners. Finally, students will be presented with various options for future employment to foster their motivation to learn.

Textbook:

1) Dang Thanh Trung, and Hoang An Quoc. Introduction to Thermal Engineering.

Reference books:

1) HCMUTE. Student Handbook. 2017.

2) Moaveni, Saeed. Engineering Fundamentals: An Introduction to Engineering. CL-Engineering, 2010.

9.2. Professional knowledge

Theoretical Mechanics

Credits: 3

Learning Time Allocation: 3/0/6

Prerequisites: None

Course Description: This course provides fundamental knowledge of mechanical engineering. In this course, the following topics will be covered: statics (statics axioms, force, connection, reaction, system analysis); kinematics (study the motion of points, objects, translation and rotation, kinematic analysis); and dynamics (physical laws, theorems of dynamics, D’Alambert principles, Lagrange equations).

Textbook:

1) Hibbeler, Russell C. Engineering Mechanics. 13th ed., Prentice Hall, 2012.

2) Meriam, J. L., and L. G. Kraige. Engineering Mechanics. 7th ed., John Wiley & Sons Inc., 2006.

Strength of Materials

Credits: 3

Learning Time Allocation: 3/0/6

Prerequisites: Theoretical Mechanics

Course Description: This course introduces students to fundamental knowledge of materials strength, methods of calculating the stress, strain in mechanical components, structural members under loading, its load capacity, and deformations.

Textbook:

- 1) Beer, Ferdinand P., and E. Russell Johnston. Mechanics of Materials. McGraw-Hill, 1992.
- 2) Hibbeler, Russell C. Mechanics of Materials. 9th ed., Prentice Hall, 2013.

Technical drawing - Basic course

Credits: 3

Learning Time Allocation: 3/0/6

Prerequisites: None

Course Description: This course provides students with the fundamental theory of engineering drawing, including the engineering drawing standards, the basic drawing skills and principles, the methods of representation and orthographic projection. It also cultivates the abilities of writing and reading the engineering drawing.

Textbooks:

- 1) Madsen, David A., and David P. Madsen. Engineering Drawing and Design. 6th ed., Cengage Learning, 2016.
- 2) Narayana, K. L., P. Kannaiah, and K. Venkata Reddy. Machine Drawing. 3rd ed., New Age International Publishers, 2008.

Mechanisms and Machine Components Design

Credits: 3

Learning Time Allocation: 3/0/6

Prerequisites: None

Course Description: This course provides the structure, working principle and calculation method of kinematic design and dynamics of the transmission mechanism and motion change, joints, and machine components commonly used in mechanics. By the end of this course, students will have the ability to independently solve the problems of calculation and design of machine parts, which serve as a basis for application in the process of calculating the design and machine details in the following technical Practice.

Electrical and Electronic Engineering

Credits: 3

Learning Time Allocation: 3/0/6

Prerequisites: None

Course Description: This course equips students with knowledge of electrical circuits, circuit design, 1-phase, and 3-phase AC circuits. The students will also be introduced to working principles and calculation methods of current regulator, synchronous motor, asynchronous motor,

DC motor, as well as working principles and calculation methods of basic electrical and electronic components such as a diode, transistor BJT, MOSFET, SCR, TRIAC, Opamp.

Textbook:

- 1) Herman, Stephen. Industrial Motor Control. Delmar Cengage Learning, 2014.
- 2) Theraja, B. L. and A. K. Theraja. A Textbook of Electrical Technology, Vol 1: Basic Electrical Engineering. S Chand & Co, 1999.
- 3) Theraja, B. L. and A. K. Theraja. A Textbook of Electrical Technology, Vol 4: Electronic Devices and Circuits. 23rd ed., S Chand & Co, 2006.

Applied Fluid Mechanics

Credits: 3

Learning Time Allocation: 3/0/6

Prerequisites: None

Course Description: This course provides students with basic knowledge about the properties of fluid mechanics and enables them to research the law of static fluid, calculate static water pressure, etc.

Textbook:

- 1) Pham Thi Thanh Tam. Fluid Technology and Pump. HCMUTE, 2003.

Reference book:

- 1) Al-Shemmeri, T. T. Engineering Fluid Mechanics. BookBoon, 2012.

Thermodynamics

Credits: 3

Learning Time Allocation: 3/0/6

Prerequisites: None

Course Description: This course provides students with basic knowledge about heat, the two laws of thermodynamics, characteristics, properties, and energy changing of thermodynamic processes, the transformation from thermal energy into work in reversible cycles, as well as the thermal properties of refrigerants that help to achieve a high-efficiency level in a system.

Textbook:

- 1) Le Kim Duong, and Dang Thanh Trung. Thermodynamics. VNU-HCM Publishing House, 2013.

Reference books:

- 1) Hoang Dinh Tin, and Le Chi Hiep. Thermodynamics. VNU-HCM Publishing House, 2008.
- 2) O'Connell, J. P., and J. M. Haile. Thermodynamics - Fundamentals for Applications. Cambridge University Press, 2005.

Heat Transfer

Credits: 3

Learning Time Allocation: 3/0/6

Prerequisites: None

Course Description: This course is designed to provide students with basic knowledge of heat transfer (thermal conductivity, convection, and radiation) used for thermal applications.

Textbook:

1) Hoàng Đình Tín. Heat Transfer and Heat Exchanger.

Reference books:

1) Hoang An Quoc. Heat Exchanger Lectures. HCMUTE, 2017.

2) Kays, W. M., and London, A. L. Compact Heat Exchangers. 3rd ed., McGraw Hill, 1984.

3) Shah, Ramesh K. Fundamentals of Heat Exchanger Design. Wiley, 2003.

Refrigeration Engineering

Credits: 4

Learning Time Allocation: 4/0/8

Course Description: This course provides the learner with the following contents: refrigerants, coolants, lubricant oils, multi-stage, multi-level refrigerating machine, absorption refrigerating machine, ejector refrigeration, and cryo basic freezers.

Textbook:

1) Hoa, Le Xuan. Fundamental Refrigeration. HCMUTE, 2007.

Reference books:

1) Dincer, Ibrahim. Refrigeration Systems and Applications. John Wiley & Sons, 2003.

2) Wang, Shan K. Handbook of Air Conditioning and Refrigeration. McGraw-Hill, 2001.

Steam Boiler

Credits: 3

Learning Time Allocation: 3/0/6

Course Description: This course provides knowledge about the concept, structure, and principles of operation and design of boiler parts. It also helps students to understand the phenomena occurring in a steam boiler.

Textbook:

1) Dang Thanh Trung. Boiler. VNU-HCM Publishing House, 2013.

Reference books:

1) Bartnik, Ryszard, and Zbigniew Buryn. Conversion Of Coal-Fired Power Plants to Cogeneration and Combined – Cycle. Springer – Verlag London Limited, 2011.

2) Ganapathy, V. Industrial Boilers and Heat Recovery Steam Generators: Design, Applications and Calculations. Marcel Dekker, Inc., 2003.

3) Nguyen, Si Mao. Boiler – Parts 1 and 2. Science and Technics Publishing House, 2006.

4) Rayaprolu, Kumar. Boilers for Power and Process. CRC Press Taylor & Francis, 2009.

Pumps, Fans, and Compressors

Credits: 3

Learning Time Allocation: 3/0/6

Course Description: This course provides students with basic knowledge about fluid machines, their structure, principles, repair and maintenance methods for fluid machines. In this course,

students will calculate, design, and create fluid machines, such as a centrifugal pump, a positive pump, a centrifugal fan, an axial fan, and compressors.

Textbook:

1) Xuan Hoa, and Nguyen Thi Bich Ngoc. Pump-Fan-Compressor. DaNang Publishing House,

Reference books:

2) Nguyen, Van May. Pump-Fan-Compressor. Science and Technology Publishing House,

Compressors and Refrigeration Equipments

Credits: 4

Learning Time Allocation: 4/0/8

Course Description: This course provides students with basic knowledge about refrigeration, its principles, compressors, heat exchangers, and refrigeration devices.

Textbook:

1) Le Xuan Hoa. Compressors and Refrigeration Equipment. HCMC University of Technology and Education.

Reference books:

1) Dincer, Ibrahim. Refrigeration Systems and Applications. John Wiley & Sons, 2003.

2) Wang, Shan K. Handbook of Air Conditioning and Refrigeration. McGraw – Hill 2017.

Air Conditioning Systems

Credits: 4

Learning Time Allocation: 4/0/8

Prerequisites: None

Course description: This course is designed to provide fundamental knowledge about different types of air conditioning systems and how to design an air conditioning system.

Textbooks:

1) Abrams, Donald W. Low Energy Cooling. Van Nostrand Reinhold Company, 1985.

2) Arora, C. P. Refrigeration and Air Conditioning. Tata-McGraw-Hill, 2003.

3) Dossat, R. J. Principles of Refrigeration. Pearson Education, Inc., 1997.

4) EE IIT. 40 Lessons on Refrigeration and Air Conditioning from IIT Kharagpur. Useful Training Material for Mechanical Engineering Students College, or as Reference for Engineer. India, Kharagpur, 2008.

5) Gosney, W. B. Principles of Refrigeration. Cambridge University Press, 1982.

6) Jones, W. P. Air Conditioning Engineering. Butterworth Heinemann, 2001.

7) McQuiston, F. C., J. D. Parker, and J. D. Spitler. Heating, Ventilating and Air Conditioning. John Wiley & Sons, Inc., 2001.

8) Prasad, M. Refrigeration and Air Conditioning. New Age International, 2002.

9) Stoecker, W. F., and J. W. Jones. Refrigeration and Air Conditioning, McGraw-Hill, 1982.

Thermal Power Plants

Credits: 4

Learning Time Allocation: 4/0/8

Course Description: This course provides students with basic knowledge of energy and primary fuels, the basic operating principles of the steam turbine/gas turbine power plants, the main equipment of thermal power plants such as boilers, steam turbine, and gas turbine, heat exchangers, economisers, superheaters, air preheaters, etc. The course also presents the methods to calculate the thermal effectiveness of thermal power plants, analyze steam and gas cycles, the effect of exhaust smoke of thermal power plants on the environment, and operation and maintenance of thermal power plants.

Textbook:

1) Nag, P. K. Power Plant Engineering. 2nd ed., McGraw Hill, 2001.

Reference books:

1) Harman, Richard T. C. Gas Turbine Engineering. New York, Wiley, 1981.

2) Woodruff, Everett B., et al. Steam Plant Operation. 8th ed., McGraw Hill, 2001.

Drying Technology and Distillation

Credits: 3

Learning Time Allocation: 3/0/6

Course Description: This course provides students with basic knowledge about the humidity materials, humid air, theoretical basis of drying technology, and an understanding of how to calculate, design, and assess the advantages and disadvantages of some common drying systems.

Textbook:

1) Dinh Thanh Ngan. Drying Techniques syllabus

Reference books:

1) Arun, S. Handbook of Industrial Drying. Taylor & Francis, 2006.

2) Hoang Van Chuoc. Drying Technique. Hanoi, Publisher of Science & Engineering, 1997.

3) Tran Van Phu. Drying Design Calculation System. Hanoi, Education Publishing House,

Principles of Thermal Process Automation

Credits: 3

Learning Time Allocation: 3/0/6

Course Description: This course provides students with basic knowledge of the principles of thermal process automation in thermal systems. Besides, this course also gives undergraduate students an understanding of the operation principles of the control systems in a thermal system such as a boiler, thermal power plants, air conditioning, etc.

Textbook:

1) Hung, H. D., H. A. Quoc, and L. X. Hoa. Thermal Measurements. Vietnam National University, Ho Chi Minh City Publisher, 2010.

2) Loi, N. D. Automatic Control in Refrigeration Systems. Education Publisher 2000.

Reference books:

1) Grimble, M. J. Computer Systems for Automation and Control. Prentice Hall International Editions, 1995.

2) Jamin, B., and C. Kuo. Automatic Control System. Prentice Hall International Editions, 1995.

Applied Mathematics in Thermal Engineering

Credits: 3

Course Description: This course provides students with the ability to apply knowledge of numerical methods, numerical analysis, and Laplace transformations acquired in modeling in order to analyze and solve problems related to thermal engineering.

Textbook:

Pletcher, Richard H., John C. Tannehill, and Dale Anderson. Computational Fluid Mechanics and Heat Transfer. 3rd ed., CRC Press, 2012.

Reference books:

- 1) Burden, Richard L., and J. Douglas Faires. Numerical Analysis. 9th ed., Brooks/Cole, 2011.
- 2) Kreyszig, Erwin. Advanced Mathematical Methods for Scientists and Engineers. Wiley, 2011.
- 3) Kurniawan, O. Introduction to Applied Math and Physics. Open Tax College, 2012.

Energy Economics

Credits: 2

Course Description: This course provides students with basic knowledge about economy and technique relationship, analysis and decision making of investment projects, and opportunities for saving energy in the industry.

Textbook:

- 1) Dang Thanh Trung, and Lai Hoai Nam. Energy Economics. VNU-HCM Publishing House, 2014.

Reference books:

- 1) Evans, Robert L. Fueling Our Future. Cambridge University Press, 2007.
- 2) Kreith, F., and Y. Goswami. Handbook of Energy Efficiency and Renewable Energy. CRC Press Taylor & Francis, 2007.
- 3) Patrick, Dale R., et al. Energy Conservation Guidebook. CRC Press Taylor & Francis, 2007.
- 4) Turner, Wayne C. Energy Management Handbook. The Fairmont Press, Inc., 2005.

Heat Exchangers

Credits: 2

Course Description: This course is designed to provide students with basic knowledge of different types of heat exchangers used for thermal application.

Textbook:

- 1) Hoang An Quoc. Heat Exchanger Lectures. HCMUTE, 2017.
- 2) Kays, W. M., and L. A. London. Compact Heat Exchangers. 3rd ed., McGraw Hill, 1984.
- 3) Shah, Ramesh K. Fundamentals of Heat Exchanger Design. Wiley, 2003.

Hydraulic Technology and Air Compress

Credits: 2

Course Description: This course provides students with basic knowledge about hydraulic power machines and compressed air, their structure, principles, characteristics, and their maintenance.

Textbook:

- 1) Pham Thi Thanh Tam. Fluid Technology and Pump. HCMUTE, 2003.

Reference books:

2) Tran Chan Chinh, and Le Thi Minh Nghia. Technology of Fluid Mechanical. HCM Polytechnic University, 1992.

Special Topics in Renewable Energy

Credits: 2

Course Description: This course provides students with fundamentals of renewable energy resources (solar energy, wind energy...) and helps them realize that the energy supply from renewable sources is an essential component of every nation's strategy, especially when there is an environmental responsibility for sustainability. Besides, this course also helps undergraduate students understand how to harness and effectively use renewable energy sources for environmental protection and energy saving.

Textbook:

1) Twidell, John, and Tony Weir. Renewable Energy Resources. Press Taylor & Francis, 2006.

Reference books:

1) Kreith, F., and Y. Goswami. Handbook of Energy Efficiency and Renewable Energy. CRC Press Taylor & Francis, 2007.

2) Patrick, Dale R., et al. Energy Conservation Guidebook. CRC Press Taylor & Francis, 2007.

Special Topics in Refrigeration Technology

Credits: 2

Course Description: This course provides students with basic knowledge about the enhancement of operating, diagnosing, and repairing of cooling systems. Also, it teaches about the methods of automatic control in a cooling system.

Textbook:

1) Hòa, Lê Xuân. Special Topics in Refrigeration Technology Textbook

Reference books:

1) Dincer, Ibrahim. Refrigeration Systems and Applications. John Wiley & Sons, 2003.

2) Wang, Shan K. Handbook of Air Conditioning and Refrigeration. McGraw-Hill, 2017.

Special Topics in Heat Technology

Credits: 2

Course Description: This course provides students with advanced knowledge about the design, operation, diagnostics, and reparation of the thermal system failures, automatic control method, and how to analyze the causes and troubleshoot problems of a thermal system.

Textbook:

1) Dang Thanh Trung. Lecture notes of Special Topics in Thermal Technology

Reference books:

1) Ganapathy, V. Industrial Boilers and Heat Recovery Steam Generators: Design, Applications and Calculations. Marcel Dekker, Inc., 2003.

2) Rayaprolu, Kumar. Boilers for Power and Process. CRC Press Taylor & Francis, 2009.

Thermal Materials

Credits: 2

Course Description: This course provides students with basic knowledge regarding the material of machines, equipment of thermal systems, boilers, turbines, insulation and fireproof materials, oil in refrigeration systems, refrigeration, etc.

Textbook:

1) Loi, N. D., V. D. Huong., and N. K. Xuong. Thermal Materials. Education Publisher, 2008.

Reference books:

1) Ronals, S. Thermal Materials: Testing and Applications. West Conshohocken PA 1991.

2) Van, E. A. Thermal Insulation Materials. Federation of European Rigid Polyurethane Forum Associations, 2006.

Thermal Measurement

Credits: 2

Course Description: This course provides students with basic knowledge of the measurements and instruments in thermal engineering, the structure and the operating principles of instruments such as thermocouples, resistance thermometers, etc., and how to install them on a thermal system.

Textbooks:

1) Hoan, H. V. Thermal Measurements. Education Publisher, 2013.

2) Hung, H. D., H. A. Quoc, and L. X. Hoa. Thermal Measurements. Vietnam National University, Ho Chi Minh City Publisher, 2010.

Reference books:

1) Eckert, Ernst R. G., and Richard J. Goldstein. Thermal Measurement in Heat Transfer. Technivision Services Slough, 1970.

2) Morris, A. S. Measurement & Instrumentation Principles. Butterworth-Heinemann, Exford 2001.

Practice of Refrigeration Technology 1

Credits: 2

Course description: This course provides the learner with an understanding of the following concepts: Compressors: semi-hermetic and open reciprocating compressors (including compression stages 1 and 2), screw compressors, etc.; and Accessories: intercooler, high-pressure receivers, oil separator, condenser, evaporator, valves, etc. This course also enables the students to gain the required skills to assemble and repair refrigeration compressors and equipment.

Textbooks:

1) Hoa, Le Xuan, et al. Refrigeration Technique Practice 1. HCMUTE, 2016.

Reference books:

1) Dincer, Ibrahim. Refrigeration Systems and Applications. John Wiley & Sons, 2003.

2) Wang, Shan K. Handbook of Air Conditioning and Refrigeration. McGraw-Hill, 2001.

Practice of Refrigeration Technology 2

Credits: 3

Course description: This course introduces the learner with the following concepts and skills: different kinds of compressors; methods in processing pipeline; methods in using measuring equipment; structure, operation, and testing of automatic control equipment; methods in using gas feeder/ gas recovery; assembling and operating air conditioning stage 1, stage 2; skills in using electric welding, brazing; vacuum, filling, and gas recovery; checking the compressor, fan, etc.

Textbook:

1) Hoa, Le Xuan, et al. Refrigeration Technique Practice 2.

Reference books:

1) Nguyen, Duc Loi, Pham Van Tuy, and Dinh Van Thuan. Refrigeration Engineering Applications.

Practice of Refrigeration Technology 3

Credits: 3

Course Description: This course provides the learner with knowledge about the principles and structures of electric, control, and protection devices, and the skills to design and execute electric circuits to operate a refrigeration system, check and set controls and protection of devices.

Textbook:

1) Hoa, Le Xuan, et al. Refrigeration Technique Practice 3.

Reference books:

1) Dincer, Ibrahim. Refrigeration Systems and Applications. John Wiley & Sons, 2003.

2) Nguyen, Duc Loi, Pham Van Tuy, and Dinh Van Thuan. Applying Refrigeration Technology. Education Publication House, 1995.

3) Tran Thanh Ky. Refrigeration Machine. Ho Chi Minh, 1983.

Practice of Refrigeration Technology 4

Credits: 3

Course Description: This course provides students with basic knowledge about the operation, test, diagnostics and troubleshooting of common failures in industrial refrigeration systems, such as cold storage system, frozen system, water chiller air conditioning system, etc.

Textbook:

1) Practice of Refrigeration Technology 4. HCMC University of Technology and Education,

Reference books:

1) Dincer, Ibrahim. Refrigeration Systems and Applications. John Wiley & Sons, 2003.

2) Wang, Shan K. Handbook of Air Conditioning and Refrigeration. McGraw-Hill, 2017.

Boiler Practice

Credits: 2

Course Description: This course provides the learner with an understanding of the principles and structure of boilers, rules of operation, handling a boiler incident during operation, and the process of maintenance of steam boilers.

Textbook:

1) Dang Thanh Trung. Boiler. VNU-HCM Publishing House, 2013.

2) Nguyen Van Tuyen. Boiler.

3) Rayaprolu, Kumar. Boilers for Power and Process. CRC Press Taylor & Francis, 2009.

Drying Practice

Credits: 2

Course Description: This course provides students with basic knowledge, principles, and operation of a number of common drying systems, measuring the basic parameters of the materials and drying agents.

Textbooks:

- 1) Hoang Van Chuoc. Drying Technique. Hanoi, Publisher of Science & Engineering, 1997.
- 2) Tran Van Phu. Calculation and Drying System Design, Education Publishing House, Ha Noi,

Refrigeration Technology Project

Credits: 1

Course Description: This course helps learners to synthesize knowledge from the previous subjects in order to apply it to a project of an industrial refrigeration system. In addition, the course also aims to teach students to develop their computing skills by using a variety of methods and software, read a catalog to select the main equipment for the refrigeration system, and make economic and technical assessments.

Textbook:

- 1) Nguyen, Duc Loi. Refrigeration System Design. 2007.

Reference books:

- 1) Dincer, Ibrahim. Refrigeration Systems and Applications. John Wiley & Sons, 2003.
- 2) Wang, Shan K. Handbook of Air Conditioning and Refrigeration. McGraw-Hill, 2001.

Thermal Project

Credits: 1

Course Description: This course helps the learner to synthesize knowledge from the previous subjects in order to apply the exercises to a large project calculation and design of an industrial thermal system. In addition, the course also aims to teach the students to develop their computing skills by using a variety of methods and software, read a catalogue to select the main equipment for a thermal system, and make economic and technical assessments.

Reference books:

- 1) Hesselgreaves, John E. Compact Heat Exchangers. Elsevier Science & Technology Books, 2001.
- 2) Kuppam, T. Heat Exchanger Design Handbook. Marcel Dekker, Inc., 2000.
- 3) Shah, Ramesh K., and Dusan P. Sekulic. Fundamentals of Heat Exchanger Design, John Wiley & Sons, Inc., 2003.

Undergraduate Internship

Credits: 2

Course Description: This course provides students with professional skills, experience, and behaviors in a corporate environment, so they may become familiar with the job position of a thermal technology engineer in a real working environment.

Undergraduate Thesis

Credits: 10

Course Description: This capstone project, also known as the applied thesis, aims to solve a particular problem related to the student's field of study, and it can be chosen by students themselves or with the help of their lecturers. This project will help students to systematize and synthesize the knowledge and skills obtained through the major and apply them in a scientific and creative manner to solve a specific problem in practice. The students can improve their thinking skills, as well as the skills to identify and solve problems independently and creatively.

10. FACILITIES FOR LEARNING

10.1. Workshops, Laboratories, and Experimental Equipment Systems

- **Workshops for learning:** Thermal-Refrigeration Workshop.
- **Laboratories:** Thermodynamics Laboratory, Heat Transfer Laboratory
- **System for experiments and practice:**
 - o Air conditioners, refrigerators for domestic use
 - o Ice block production refrigeration system
 - o Freezing system
 - o Freezing storage system
 - o Central air conditioning system (water chiller)
 - o Central air conditioning system VRV4
 - o Intelligent control system
 - o Boiler system
 - o Fluidized bed drying system
 - o Chamber drying cabinet
 - o Tower drying system
 - o Rotary drum drying system
 - o Thermoelectric system
 - o VRF air conditioning system
 - o Air conditioning system using AHU and cold storage
- **Numerical simulation software:** COMSOL, CFD ACE+, Matlab, Fortran, ...

10.2. Library and Websites

Ho Chi Minh City University of Technology and Education Library

Ho Chi Minh City National University Library

<https://www.sciencedirect.com>

<https://www.wikipedia.org>

<https://thuvienso.hcmute.edu.vn>

<https://csdl.hcmute.edu.vn>

11. Program Implementation Guidelines

a. The training program is implemented in accordance with the current regulations for full-time university-level credit-based training, as stipulated by the Ministry of Education and Training and Ho Chi Minh City University of Technology and Education.

The specified hours are calculated as follows:

- **1 credit** = 15 hours of theoretical lectures or in-class discussions
- **1 credit** = 30 hours of laboratory work or practical exercises
- **1 credit** = 45 hours of self-study
- **1 credit** = 45 - 90 hours of on-site internship
- **1 credit** = 45 - 60 hours for project work or graduation thesis

The total hours for a course must be a multiple of 15.

b. Foreign language output standards are determined by the university's Academic Council at the beginning of each admission intake. During their studies, the university will monitor students' foreign language proficiency development each academic year to decide the number of course credits students are allowed to register for per semester. Students may self-study or enroll in the foreign language competency development program according to the university's plan.

Ho Chi Minh City, Date of Review: 16th June, 2025

RECTOR

DEAN

Assoc. Prof. Dr. Le Hieu Giang

Assoc. Prof. Dr. Truong Dinh Nhon