TRƯỜNG ĐẠI HỌC
SƯ PHẠM KỸ THUẬT TP. HỒ CHÍ MINH
KHOA ĐÀO TẠO QUỐC TẾ
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UNDERGRADUATE CURRICULUM MANUAL

THERMAL ENGINEERING TECHNOLOGY

2022

THERMAL ENGINEERING TECHNOLOGY

I. CURRICULUM

1st Semester

No.	Course ID	Course Title	Credits	Prerequisite
1	ACEN340535E	Academic English 1	4	
2	ACEN340635E	Academic English 2	4	
3	INTE130132E	Introduction to thermal engineering technology	3	
4	MATH132401E	Calculus 1	3	
5	GCHE130603E	General Chemistry for Engineers	3	
6	PHED110513E	Physical Education 2	0(1)	
7	LLCT130105E	Principles of Marxism-Leninism	3	
8	GELA220405E	General Law	2	
Total			**22**	

2nd Semester

No.	Course ID	Course Title	Credits	Prerequisite
1	ACEN440735E	Academic English 3	4	
2	ACEN440835E	Academic English 4	4	
3	IPRM131585E	Matlab	3	
4	MATH132501E	Calculus 2	3	
5	PHYS130902E	Physics 1	3	
6	PHYS111202E	Physics - Laboratory 1	1	
7		*Select Generic course 1*	*2*	
8		*Select Mathematics and Natural Sciences 1*	*3*	
9	LLCT120405E	Scientific socialism	2	
9	LLCT120205E	Political economic of Marxism-Leninism	2	

Total	27	

3rd Semester

No.	Course ID	Course Title	Credits	Prerequisite
1	~~TEEN230132E~~	~~Technical English 1~~	~~3~~	
2	MATH132601E	Calculus 3	3	
3		*Select Generic course 2*	*2*	
4		*Select Mathematics and Natural Sciences 2*	*3*	
5	ENDR130123E	Engineering Drawing 1	3	
6	THME230721E	Theory Mechanics	3	
7	FLUI220132E	Applied Fluid Mechanics	2	
8	THER230232E	Thermodynamics	3	
9	LLCT120314E	Ho Chi Minh's Ideology	2	
Total			**21**	

4th Semester

No.	Course ID	Course Title	Credits	Prerequisite
1	LLCT220514E	Revolution of Vietnamese Communist Party	2	
2	MATH132901E	Probability and Applied Statistics	3	
3	EEEN234062E	Electrical and Electronic Engineering	3	
4	~~EHQT230437E~~	~~Academic English 4~~	~~3~~	
5	STMA230521E	Strength of Materials	3	
6	AMTE223532E	Applied mathematics- TET	2	
7	HEAT230332E	Heat transfer	3	
Total			**16**	

5th Semester

No.	Course ID	Course Title	Credits	Prerequisite
1		*Select Fundamental course 1*	*2*	
2		*Select Fundamental course 2*	*2*	
3	MEMD230323E	Theory of machine and machine design	3	
4	REEN230532E	Refrigeration Engineering	3	
5	BOIT330632E	Steam boiler	3	
6	PFCO330232E	Pumps, Fans and Compressors	3	
7	DRYT331132E	Drying Technology and Distillation	3	
8		*Select Multidisciplinary 1*	*2*	
	IEPR550935E	IELTS Preparation	0(5)	Non-accumulation
Total			**21**	

6th Semester

No.	Course ID	Course Title	Credits	Prerequisite
1		*Select Multidisciplinary 2*	2	
2		*Select Multidisciplinary 3*	2	
3	COMP330732E	Compressors and refrigeration equipments	3	
4	ACSY340932E	Air Conditioning Systems	4	
5	THPP331032E	Thermal Power plants	3	
6		*Select Specialized course 1*	*2*	
7	RETP322132E	Practice of Refrigeration Technology 1	2	
8	RETP332232	Practice of Refrigeration Technology 2	3	
9	RETP332332E	Practice of Refrigeration Technology 3	3	

Total	**24**	

7th Semester

No.	Course ID	Course Title	Credits	Prerequisite
1	BOIP322732E	Boiler Practice	2	
2	RETP322432E	Practice of Refrigeration Technology 4	2	
3	DRYP322932E	Drying Practice	2	
4		*Select Specialized course 2*	*1*	
5	ENSE320932E	Enterprise Seminar - TET	*2*	
6	UNPR443032E	Undergraduate Internship	4	
	ENTW611038E	English for Thesis Writing	1	
Total			**14**	

8th Semester

No.	Course ID	Course Title	Credits	Prerequisite
1	UNTH472832E	Undergraduate Thesis	7	
Total			**7**	

ELECTIVE COURSES

Total elective courses: 10 Credits

IV. Mathematics and Natural Sciences (select 2 in 4 courses)			**6**	**Note**
1	MATH133101E	Higher mathematics for engineers 1	3	Following the Texas Tech University
2	MATH133201E	Higher mathematics for engineers 2	3	
3	MATH133501E	Linear algebra	3	
4	PHYS131102E	Principle of Physics 2	3	
V. Social sciences and humanities (select 2 in 13 courses)			**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 logic	2	
5	IVNC320905E	Vietnamese culture	2	
6	INSO321005E	Introductory sociology	2	
7	ENPS220591E	Engineering psychology	2	
8	SYTH220491E	System thinking	2	
9	LESK120190E	Learning skills	2	
10	PLSK120290E	Planning skills	2	
11	WOPS120390E	Workplace skills	2	
12	REME320690E	Research method	2	
13	BPLA121808E	Business plan	2	
Total			**10**	

SPECIALIZED KNOWLEDGE

No.	Course id	Course Title	Credits	Previous course code
Required knowledge			**72**	
I. Fundamental courses			**23**	
1	THME230721E	Theory Mechanics	3	
2	STMA230521E	Strength of Materials	3	
3	ENDR130123E	Engineering Drawing 1	3	
4	MEMD230323E	Theory of machine and machine design	3	
5	EEEN234062E	Electrical and Electronic Engineering	3	
6	FLUI220132E	Applied Fluid Mechanics	2	
7	THER230232E	Thermodynamics	3	
8	HEAT230332E	Heat transfer	3	
II. Specialized courses			**22**	
1	REEN230532E	Refrigeration Engineering	3	
2	BOIT330632E	Steam Boilers	3	
3	PFCO330232E	Pumps, Fans and Compressors	3	
4	COMP330732E	Compressors and refrigeration equipments	3	
5	ACSY340932E	Air Conditioning Systems	4	
6	THPP331032E	Thermal Power plants	3	
7	DRYT331132E	Drying Technology and Distillation	3	
III. Workshop practice courses			**14**	
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	RETP322432E	Practice of Refrigeration Technology 4	2	
5	BOIP322732E	Boiler Practice	2	
6	DRYP332932E	Drying Practice	2	
IV. Enterprise Seminar - TET			**2**	
1	ENSE320932E	Enterprise Seminar - TET	2	
V. Undergraduate Internship (UNPR443032E)			**4**	

VI. Undergraduate thesis (UNTH472832E**)**			**7**	
Elective courses			**13**	
I. Fundamental courses			**4**	
1	THMA221332E	Thermal Materials	2	*Select 2 in 7 courses*
2	METE320126E	Metal Technology	2	
3	OPTI423129E	Optimization	2	
4	THME221432E	Thermal Measurements	2	
5	PICE220130E	Internal Combustion Engine Principles	2	
6	PHEQ220332E	Hydraulic Technology and Air Compress	2	
7	AMIC320133E	Applied Microcontroller	2	
II. Specialized courses			**3**	
1	HEEX321532E	Heat exchangers	2	*Select 1 course with 2 credits and 1 course with 1 credit*
2	PTPA321632E	Principles of Thermal Process Automation	2	
3	ENEC320832E	Energy Economics	2	
4	STRT321732E	Special Topics in Refrigeration Technology	2	
5	STHT321832E	Special Topics in Heat Technology	2	
6	STRE321932E	Special Topics in Renewable Energy	2	
7	REPR310132E	Refrigeration Technology Projects	1	
8	THPR310232E	Thermal Project	1	
III. Multidisciplinary courses (Students should be consulted by the head of the department to make an appropriate choice, not re-select the courses studied)			**6**	
1	PLCT220146E	PLC	2	*Select 3 in 10 courses*
2	HEEX321532E	Heat exchangers	2	
3	PTPA321632E	Principles of Thermal Process Automation	2	
4	ENEC320832E	Energy Economics	2	
5	STRT321732E	Special Topics in Refrigeration Technology	2	
6	STHT321832E	Special Topics in Heat Technology	2	
7	STRE321932E	Special Topics in Renewable Energy	2	
8	IMAS320525E	Industrial maintenance and maintenance	2	
9	AUMP323525E	Automation on the production process	2	
10	ERMA321025E	Energy and Energy management	2	

6.3. Massive Open Online Courses

In order 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 equivalent course

1	INTE130132E	Introduction to thermal engineering technology	3 (2+1)	ASU, 2 credits, 16 weeks, https://gfa.asu.edu/courses/online-engineering-course
2	THER230232E	Thermodynamics	3	University of Michigan, 8 weeks, https://www.mooc-list.com/course/introduction-thermodynamics-transferring-energy-here-there-coursera
3	FLUI220132E	Applied Fluid Mechanics	2	https://www.mooc-list.com/course/fluid-mechanics-saylororg
4	STRE321932E	Special Topics in Renewable Energy	2	https://www.mooc-list.com/course/wind-waves-and-tides-alternative-energy-systems-coursera

6.4 Additional knowledge

The university adds knowledge, not accumulation, but students must complete these courses to be considered for graduation.

No.	Course id	Course Title	Credits	Note
1	TEEN230232E	Technical English 2	3	
2	DSME433632E	Design software in ME	3	

Courses are taught from other institutions

No.	Course id	Course Title	Credits	Note
1	CDST424032E	Designing and supervising refrigeration systems	2	
2	SIMA424132E	Simulation and energy management	2	

II. COURSE DESCRIPTION

Air Conditioning Engineering **Credits: 3**

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.

Applied Mathematics in Thermal Engineering **Credits: 2**

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 Mechanincs 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.

Steam Boiler **Credits: 3**

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.

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.

Compressors and Refrigeration Equipment **Credits: 3**

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.

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,

Drying Technology and Distillation **Credits: 3**

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,

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.

Applied Fluid Mechanics **Credits: 2**

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.

Heat Transfer **Credits: 3**

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.

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.

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.

Pump, Fan and Compressor **Credits: 3**

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,

Hydraulic Machines and Compressed Air **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.

Principles of Thermal Process Automation **Credits: 2**

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.

Refrigeration Engineering **Credits: 3**

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.

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.

Refrigeration Technology Practice 1 **Credits: 3**

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.

Refrigeration Technology Practice 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.

Refrigeration Technology Practice 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.

Refrigeration Technology Practice 4 **Credits: 2**

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.

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 Thermal 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.

Thermodynamics **Credits: 3**

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.

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 Pulisher, 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 Foram 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.

Thermal Power Plants **Credits: 3**

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.

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 catalog 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) Kuppan, 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: 3**

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.

Graduation Thesis **Credits: 7**

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.