

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

UNDERGRADUATE PROGRAM
Major of
AUTOMATION AND CONTROL ENGINEERING
TECHNOLOGY

*(Issued under Decision No. 3744 /QĐ-ĐHSPKT dated 06 / 10 /2025 by the President of
Ho Chi Minh City University of Technology and Education)*

Education Program: Automation and Control Engineering Technology

Level: Undergraduate

Major: Automation and Control Engineering Technology

Major Code: 7510303A

Ho Chi Minh City, 2025

UNDERGRADUATE PROGRAM

Education Program: Automation and Control Engineering Technology

Level: Undergraduate

Major: Automation and Control Engineering Technology

Major Code: 7510303A

Type of Program: Full time

Graduation Diploma: ENGINEER

(Issued under Decision No. 3744 /QĐ-ĐHSPKT dated 06 / 10 /2025 by the President of Ho Chi Minh City University of Technology and Education)

1. Duration of Study: 4 years

2. Student Enrollment: High-school Graduates

3. Grading System, Curriculum and Graduation Requirements

- Grading Scale: 10
- Training Process: According to Decision No. 3116/QĐ-ĐHSPKT dated 22/08/2025 of Ho Chi Minh City University of Technology and Education on promulgating the university-level training regulations.
- Graduation Requirements:
 - General Requirements: According to Decision No. 3116/QĐ-ĐHSPKT dated 22/08/2025 of Ho Chi Minh City University of Technology and Education on promulgating the university-level training regulations.
 - Specialized Requirements: According to the general regulations of Ho Chi Minh City University of Technology and Education.

4. The objectives and Expected Learning Outcomes

Goals

Training human resources, improving intellectual standards of the people, fostering talents; researching science and technology for new knowledge & product creation to meet the requirements of development of economics & society, to ensure national defense, security and international integration.

Training learners have political qualities, morality, knowledge, professional practice skills, research capacity, development of scientific applications and technologies that are commensurate with the level of training. They have a healthy body, creative capability and professional responsibility, adaptability to the work environment; spirit of serving the people.

Training Engineers of Automation and Control Engineering Technology (ACET) major have basic scientific knowledge, fundamental knowledge, specialized knowledge of automation and control major, analysis capability, solve problem skills and solutions assessment, ability contribution, design, operation of automation and control systems,

communication skills and work in a team, professional attitudes, meet the development requirements of major and society. After graduation, the graduates are able to work in companies, factories, industrial manufacturers or operation of automatic control systems and ACET education organizations.

Objectives

- PO1: Form a stable foundation of general knowledge, foundation and core knowledge and specialized/ major knowledge of Automation and Control Engineering Technology.
- PO2: Use proficiently self-studying skills major, problem-solving skills and professional skills in the major of Automation and Control Engineering Technology.
- PO3: Communicate effectively, organize, lead and conduct teamwork.
- PO4: Apply well competences of brainstorming, designing, deploying, and operating the Automation Control System, Robotic systems, PLC System, Electric Drive, to improvement or creation of electrical and electronic products.
- PO5: Be able to grasp society's needs, carry out social responsibilities, respect work ethics and be aware of life-long learning.

Program outcomes

A. General knowledge, fundamental and specialized knowledge of Automation and Control major:

- ELO 1.1. Apply fundamental knowledge of mathematics, natural science and social science; achieve more specialized knowledge and study further at higher levels.
- ELO 1.2. Construct the basis of core technological knowledge about Automation and Control.
- ELO 1.3. Create the combination of advanced specialized knowledge in the fields Automation and Control systems.

B. Specialized and professional skills in electrical and electronics major:

- ELO 2.1. Analyze and argue for technical matters; brainstorm systematically and solve automatic control system matters.
- ELO 2.2. Examine and experiment with electrical and electronic matters.
- ELO 2.3. Implement proficiently professional skills in the Automation and Control field.
- ELO 2.4. Be aware of life-long learning.
- ELO 2.5. Realize the roles and responsibility of engineers and social circumstances which have impacts on the technical activities of the electrical and electronic industry.

C. Communication skills and ability to work in multidisciplinary areas:

- ELO 3.1. Work independently; lead and work in a team.
- ELO 3.2. Communicate effectively in various methods: written communication, electronics communication, graphics and presentation.
- ELO 3.3. Comprehend business culture, work ethics principles, and working style of industrial organizations.

D. Skills to take shape of ideas, design, deploy and operate industrial electrical systems

ELO 4.1. Recognizing the importance of social environment on technical activities in the field of control and automation.

ELO 4.2. Ability to implement small and medium automatic control systems for industrial, service and public systems.

ELO 4.3. Ability to propose implementation solutions, management of control and automation systems.

ELO 4.4. Ability to apply information technology in hardware and software design for automation systems.

ELO 4.5. Participate in building, organizing, operating and managing projects on effective control and automation.

ELO 4.6. Ability to design and operate control systems, industrial communication networks in manufacturing plants.

ELO 4.7. Able to lead technical departments related to control and automation.

ELO 4.8. Be aware of business opportunities that can apply technology and create new products.

5. Total program credits: 158 credits

(not including physical, national defense education and Enterprise Seminar)

Foreign Language Knowledge:

- Students with an IELTS ≥ 4.5 or equivalent (as per Decisions No. 3239/QĐ-ĐHSPKT dated 03/09/2025) 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 will study Communicative English 1,2.
 - If a student achieves Level 2, they will study Academic English 1,2.
- Sequence of English courses: Communicative English 1,2 $\rightarrow$ Academic English 1, 2.

Note:

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

6. Allocation of Knowledge Group

Groups of Courses	Credits		
	Total	Compulsory	Elective
General Knowledge	59	50	9
General Politics + Laws	14	14	
Social Sciences and Humanities	4		4
Mathematics and Natural Sciences	27	22	5
Technical Computer Sciences	3	3	

Introduction to Automation Control Engineering Technology	3	3	
English	8	8	
Professional knowledge	99	84	15
Foundation of Major	38	32	6
Professional Major	30	21	9
Practices	19	19	0
Internship	2	2	
Capstone project (ACET)	10	10	
Physical and National Defense Education	Non-accumulation		
<i>National Defence Education 1</i>	1		
<i>National Defence Education 2</i>	1		
<i>National Defence Education 3</i>	1		
<i>National Defence Education 4</i>	1		
<i>Physical Education 1</i>	1		
<i>Physical Education 2,3</i>	2		
Communicative English	Non-accumulation		
Communicative English 1	4		
Communicative English 2	4		
Enterprise Seminar	1		
Total	158	131	27

7. Program content

A – Compulsory courses

7.1. Foundation science courses: 51

No.	Course's ID	Course name	Credits	Note
I.	Political Education and General Laws		14	
	LLCT120205E	Political economics of Marxism and Leninism	2	
1.	LLCT120314E	Ho Chi Minh's ideology	2	
2.	LLCT130105E	Philosophy of Marxism and Leninism	3	
3.	LLCT120405E	Scientific socialism	2	

4.	LLCT220514E	History of Vietnamese communist party	2	
5.	GELA236939E	General Laws	3	
II.	Mathematics and Natural Sciences		25	
6.	MATH132401E	Calculus 1	3	
7.	MATH132501E	Calculus 2	3	
8.	MATH132601E	Calculus 3	3	
9.	MATH132901E	Mathematical Statistics for Engineers	3	
10.	PHYS130902E	Physics 1	3	
11.	PHYS131002E	Physics 2	3	
12.	PHYS111202E	Physics - Lab 1	1	
13.	GCHE130603E	General Chemistry for Engineers	3	
14.	PYPA334546E	Python and Applications	3	
15.	ACEN340535E	Academic English 1	4	
16.	ACEN340635E	Academic English 2	4	
17.	IEAC130046E	Introduction to Automation and Control Engineering Technology	3(2+1)	1 Practice
ELECTIVE COURSES			12	
VI.	Elective Mathematics and Natural Sciences Courses		5	
18.	AMEE142044E	Applied Mathematics in Electrical Engineering	4	chosen
19.	PHYS111302E	Physics - Lab 2	1	chosen
20.	MATH133101E	Higher Mathematics for Engineers 1	3	
21.	MATH133201E	Higher Mathematics for Engineers 2	3	
22.	PHYS131102E	Principles of Physics 3	3	
23.				
VII.	Elective Social Science courses (Choose 02 out of 12 courses)		4	
1.	GEFC220105E	General Economics	2	Choose 1
2.	IQMA220205E	Introduction to Quality Management	2	
3.	INMA220305E	Introduction of Management	2	

4.	INLO220405E	Introduction to Logic	2	Choose 1
5.	BPLA121808E	Business Plan	2	
6.	ENPS220591E	Engineering Psychology	2	
7.	SYTH220491E	System Thinking	2	
8.	PLSK120290E	Planning Skills	2	
9.	WOPS120390E	Workplace Skills	2	
10.	REME320690E	Research Method	2	
National Defense Education			0 (4)	
1	GDQP110131	Giáo dục quốc phòng 1 (<i>National Defence Education 1</i>)	1	Non-accumulation
2	GDQP110231	Giáo dục quốc phòng 2 (<i>National Defence Education 2</i>)	1	Non-accumulation
3	GDQP110331	Giáo dục quốc phòng 3 (<i>National Defence Education 3</i>)	1	Non-accumulation
4	GDQP110431	Giáo dục quốc phòng 4 (<i>National Defence Education 4</i>)	1	Non-accumulation
	PHED110130	Giáo dục thể chất 1 (<i>Physical Education 1</i>)	1	Non-accumulation
Giáo dục thể chất 2,3 (<i>Physical Education 2,3</i>)			2	Choose 2
1	PHED110130	Giáo dục thể chất 1 (<i>Physical Education 1</i>)	0 (1)	30hours (9LT + 21TH)
Select 2 Courses				
1	FOOT112330	Bóng đá (<i>Football</i>)	1	Non-accumulation
2	VOLL112330	Bóng chuyền (<i>Volleyball</i>)	1	Non-accumulation
3	BASK112330	Bóng rổ (<i>Basketball</i>)	1	Non-accumulation
4	BADM112330	Cầu lông (<i>Badminton</i>)	1	Non-

				accumulation
5	TENN112330	Quần vợt (<i>Tennis</i>)	1	Non-accumulation
6	KARA112330	Không thủ đạo (<i>Karate</i>)	1	Non-accumulation
7	CHES112330	Cờ vua (<i>Chess</i>)	1	Non-accumulation
8	CHIN112330	Cờ tướng (Chinese Chess)	1	Non-accumulation
9	YOGA112330	Yoga (Yoga)	1	Non-accumulation
10	PICK112330	Pickleball	1	Non-accumulation

7.2. Automation and Control Engineering Technology Courses

7.2.1. Fundamental ACET courses: 38

No.	Course's ID	Course name	Credits	Note
1.	ELCI140144E	Electric Circuit	4	
2.	ELEC230262E	Electronics Circuit 1	3	
3.	ELEC330362E	Electronics Circuit 2	3	
4.	DIGI330163E	Digital Systems	3	
5.	MICR330363E	Microprocessor	3	
6.	ELMA240344E	Electrical Machines	4	
7.	POEL330262E	Power Electronics	3	
8.	PLCS330846E	Programmable Logic Controller	3	
9.	ACSY330346E	Automatic Control Systems	3	
10.	MESE431744E	Instrumentation and Sensors	3	
11.		<i>Elective Fundamental course 1</i>	3	
12.		<i>Elective Fundamental course 2</i>	3	

Elective Fundamental course 1, 2 (Students choose 2 out of the below mentioned courses)			6	
1.	ELFI 230344E	Electromagnetic Field	3	
2.	EEMA330544E	Electronic and Electrical Materials	3	
3.	ELPS330345E	Electrical Power Supply	3	
4.	SISY330164E	Signals and Systems	3	

7.2.2.a Advanced ACET courses: 30 credits

No.	Course's ID	Course name	Credits	Note
1.	ROBO330246E	Robotics		
2.	EEQU333746E	Electrical Equipment and Pneumatic	3	
3.	SCDA430946E	SCADA Systems	3	
4.	AACS330546E	Advanced Automatic Control Systems	3	
5.	PLCS330846E	Programmable Logic Controller	3	
6.	RBPR310846E	Project on Robotics	1	
7.	ARPR310746E	Project on Automatic Control	1	
8.	PLCR311146E	Project on Programmable Logic Controller	1	
9.	SEMI310026E	Enterprise Seminar	0(1)	
10.	SASC430546E	Sensor and Signal Processing Techniques	3	
11.	AIAP433846E	AI and Applications	3	
12.		Elective Advanced Course 1	3	
13.		Elective Advanced Course 2	3	
14.		Elective Advanced Course 3	3	
II	Elective Advanced Courses (Students choose 3 out of the below mentioned courses)		9	
1.	IMPR432446E	Image Processing in Industrial	3	
2.	CADA331646E	CAD for Automation and Control Engineering	3	
3.	PRCO332146E	Process Control	3	
4.	FMCI431746E	FMS and CIM	3	
5.	MCCO332246E	Measurement and Control Using PC	3	

6.	MOIS333546E	Modelling and Simulation using Computer	3	
7.	INCO331546E	Intelligent Control	3	
8.	IDCN434146E	Industrial Communication Network	3	
9.	ITAA433946E	IOT and Applications	3	
10.	AROB434046E	Advanced Robotics	3	
11.	NLCT334346E	Non-linear Control	3	
12.	OPCO334246E	Optimization Control	3	
13.	RENE331745E	Renewable Energy	3	
14.	EMSY435664E	Embedded Systems	3	
15.	DSIC330563E	Digital Systems Design with HDLs	3	
16.	ELDR330545E	Automatic Electric Drive	3	
17.	ITFA336064E	Internet of Things Foundations and Applications	3	

D Massive Open Online Courses: MOOC:

To facilitate enhanced access to advanced training programs, students can independently choose proposed online courses from the following table to be considered equivalent to courses in the curriculum:

No.	Course's ID	Course name	Credits	Course eligible for MOOC equivalency (registration link provided)
1.	FSE 100	Introduction to Engineering: Imagine, Design, Engineer	3	Arizona State University https://gfa.asu.edu/courses/online-engineering-course
2.	CSE 110	Programming for Everyone: Introduction to Programming	3	Arizona State University https://gfa.asu.edu/courses/online-programming-course
3.	CS 8802	Artificial Intelligence for Robotics	3	https://www.class-central.com/course/udacity-artificial-intelligence-for-robotics-319
4.		Industrial Automation and Control	3	https://www.class-central.com/course/nptel-

				<u>industrial-automation-and-control-5222</u>
5.		Embedded Systems - Shape The World: Microcontroller Input/Output	3	<u>https://www.class-central.com/course/edx-embedded-systems-shape-the-world-microcontroller-input-output-1484</u>

7.2.2.b. Advanced ACET courses: 21 (courses in workshop, industrial internship, Extracurricular activities + specialized seminars)

No.	Course's ID	Course name	Credits	Note
Practice and experiment			21	
1.	ELPR220644E	Electricity in Practice	2	
2.	PREM310744E	Electric Machine in Practice	1	
3.	POEP320262E	Power Electronics in Practice	2	
4.	ELPR320762E	Electronics in Practice	2	
5.	PRDI319263E	Digital Systems in Practice	1	
6.	PRMI320463E	Microprocessor in Practice	2	
7.	PPLC321346E	Programmable Logic Controller in Practice	2	
8.	ROPR321246E	Robotics in Practice	2	
9.	PMEM320846E	Electrical Equipment and Pneumatic	2	
10.	PACS321446E	Automatic Control System in Practice	2	
11.	PMOC314446E	Motion Control System in Practice	1	
12.	ININ422346E	Internship	2	

7.2.3. Graduation Thesis (or graduation examination): 7

No.	Course's ID	Course name	Credits	Note
1	FIPR402546E	Graduation Thesis	10	

Training Plan

1st Semester

No.	Course's ID	Course name	Credits	Prerequisite	Term 1/2
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1.	ICET335046E	Introduction to Automation and Control Engineering	3(2+1)		1
2.	ACEN340535E	Academic English 1	4		1
3.	ACEN340635E	Academic English 2	4		1
4.	GELA236939E	General Laws	3		1
5.	GCHE130603E	General Chemistry for Engineers	3		2
6.	PHYS130902E	Physics 1	3		2
7.	PHED110130E	Physical Education 1	0		2
8.	PYPA334546E	Python and Applications	3		2
9.	MATH132401E	Calculus 1	3		2
Total			26		

2nd Semester

No.	Course's ID	Course name	Credits	Prerequisite	Term 1/2
1.	LLCT130105E	Philosophy of Marxism and Leninism	3		1
2.	AMEE142044E	Applied Mathematics in Electrical Engineering	4		1
3.	PHYS130502E	Physics 2	3		1
4.	MATH132501E	Calculus 2	3		2
5.	PHYS111202E	Physics - Lab 1	1		2
6.	ELCI140144E	Electrical Circuits	4		2
Giáo dục thể chất 2 (Physical Education 2)			1	Choose 1	
1	FOOT112330	Bóng đá (Football)	1	Non-accumulation	
2	VOLL112330	Bóng chuyền (Volleyball)	1	Non-accumulation	
3	BASK112330	Bóng rổ (Basketball)	1	Non-accumulation	
4	BADM112330	Cầu lông (Badminton)	1	Non-	

				accumulation	
5	TENN112330	Quần vợt (<i>Tennis</i>)	1	Non-accumulation	
6	KARA112330	Không thủ đạo (<i>Karate</i>)	1	Non-accumulation	
7	CHES112330	Cờ vua (<i>Chess</i>)	1	Non-accumulation	
8	CHIN112330	Cờ tướng (<i>Chinese Chess</i>)	1	Non-accumulation	
9	YOGA112330	Yoga (<i>Yoga</i>)	1	Non-accumulation	
	PICK112330	Pickleball	1	Non-accumulation	
		Giáo dục Quốc phòng <i>National Defence Education</i>	4	Non-accumulation	
Total			18		

3rd Semester:

No.	Course's ID	Course name	Credits	Prerequisite	Term 1/2
1.	LLCT120205E	Political Economics of Marxism and Leninism	2		1
2.	MATH132601E	Calculus 3	3		1
3.	MATH132901E	Mathematical Statistics for Engineers	3		1
4.	ELEC230262E	Electronics Circuit 1	3		1
5.	MESE431744	Instrumentation and Sensors	3		2
6.	PHYS111302E	Physics - Lab 2	1		2
7.	ELPR220644E	Electricity in Practice	2		2
8.	LLCT120405E	Scientific socialism	2		2

9.		<i>Fundamental course 1 (Option)</i>	3		2
10.		<i>Fundamental course 2 (Option)</i>	3		2
Giáo dục thể chất 3 (Physical Education 3)			0(1)		2
1	FOOT112330	Bóng đá (Football)	0(1)		
2	VOLL112330	Bóng chuyền (Volleyball)	0(1)		
3	BASK112330	Bóng rổ (Basketball)	0(1)		
4	BADM112330	Cầu lông (Badminton)	0(1)		
5	TENN112330	Quần vợt (Tennis)	0(1)		
6	KARA112330	Không thủ đạo (Karate)	0(1)		
7	CHES112330	Cờ vua (Chess)	0(1)		
8	CHIN112330	Cờ tướng (Chinese Chess)	0 (1)	30hours (9LT + 21TH)	
9	YOGA112330	Yoga (Yoga)	0 (1)	30hours (9LT + 21TH)	
	PICK112330	Pickleball	1	Non-accumulation	
Total			25		

4th Semester:

No.	Course's ID	Course name	Credits	Prerequisite	Term 1/2
1.	LLCT120314E	Ho Chi Minh's ideology	2		1
2.	DIGI330163E	Digital Systems	3		1
3.	POEL330262E	Power Electronics	3		1
4.	ELEC330362E	Electronics Circuit 2	3		1
5.	ELPR320762E	Electronics in Practice	2		1
6.	ACSY330346E	Automatic Control Systems	3		2
7.	ELMA240344E	Electrical Machines	4		2
8.	POEP320262E	Power Electronics in Practice	2		2
9.	LLCT220514E	History of Vietnamese communist party	2		2

10.		Elective Social Science Course 1	2		2
Total			26		

5th Semester:

No.	Course's ID	Course name	Credits	Prerequisite	Term 1/2
1.	PRDI310263E	Digital Systems in Practice	1		1
2.	MICR330363E	Microprocessor	3		1
3.	AIAP433846E	AI and Applications	3		1
4.	PACS320246E	Automatic Control System in Practice	2		1
5.	PREM310744E	Electric Machine in Practice	1		1
6.	SASC430546E	Sensor and Signal Processing Techniques	3		2
7.	EEQU333746E	Electrical Equipment and Pneumatic	3		2
8.	PLCS330846E	Programmable Logic Controller	3		2
9.	ARPR310746E	Project on Automatic Control	1		2
10.		Elective Advanced Course 1	3		2
Total			23		

6th Semester:

No.	Course's ID	Course name	Credits	Prerequisite	Term 1/2
1.	PRMI 320463E	Microprocessor in Practice	2		1
2.	PMEM320846E	Electrical Equipment and Pneumatic in Practice	2		1
3.	ROBO330246E	Robotics	3		1
4.	PPLC321346E	Programmable Logic Controller in Practice	2		1
5.	AACS330546E	Advanced Automatic Control Systems	3		2
6.	PLCR311146E	Project on Programmable Logic Controller	1		2

7.		Elective Advanced Course 2	3		2
8.		Elective Advanced Course 3	3		2
9.					
Total			19		

7th Semester:

No.	Course's ID	Course name	Credits	Prerequisite	Term 1/2
1.	SEMI310026E	Enterprise Seminar	0 (1)	Non-accumulation	1
2.	SCDA430946E	SCADA Systems	3		1
3.	ININ422346E	Industry Internship	2		1
4.	PMOC314446E	Motion Control System in Practice	1		1
5.	ROPR311246E	Robotics in Practice	2		2
6.	RBPR310846E	Project on Robotics	1		2
7.		Elective Social Science Course 2	2		2
Total			11		

8th Semester:

No.	Course's ID	Course name	Credits	Prerequisite	Term 1/2
1.	FIPR402546E	Graduation Thesis	10		2
Total			10		

9. COURSE DESCRIPTION

1. Academic English 1

Credits: 4

Prerequisite course(s): Communicative English 1

Corequisite course(s): Academic English 2

Previous course(s): N/A

Course Description:

This is the first course of the Academic English series designed for students majoring in the areas other than English to achieve the intermediate level of English language proficiency (equivalent to B2.1 level of CEFR) in Speaking and Listening skills. The series aims to enhance students' English competence to deal with complex matters of everyday life in other countries, to exchange specific information and personal ideas with young people and adults who speak English, and to achieve a wider understanding of thoughts from people of other cultures. This course particularly provides students with the opportunities to understand the main ideas of complex oral English on quite abstract topics,

including basic technical discussions in their fields of specialization. Students are asked to orally interact with a degree of fluency that makes regular interactions with native English speakers quite possible with some strain. They are also prepared to orally produce clear, detailed texts on a limited range of subjects and explain a viewpoint on a topical issue giving the advantages and disadvantages of a few options. In addition, this course promotes students' development of presentation skills, teamwork ability, and learner autonomy by engaging them in various interactive activities.

Textbooks:

Kisslinger, E., & Baker, L. (2024). *Skillful 3 Listening and Speaking* (3rd ed.). Macmillan Education.

2. Academic English 2

Credits: 4

Prerequisite course(s): Communicative English 2

Corequisite course(s): Academic English 1

Previous course(s): N/A

Course Description:

This is the second course of the Academic English series designed for students majoring in the areas other than English to achieve the intermediate level of English language proficiency (equivalent to B2.1 level of CEFR) in Reading and Writing skills. The series aims to enhance students' English competence to deal with complex matters of everyday life in other countries, to exchange specific information and personal ideas with young people and adults who speak English, and to achieve a wider understanding of thoughts from people of other cultures. This course particularly provides students with the opportunities to understand the main ideas of complex English texts on quite abstract topics, including basic technical discussions in their fields of specialization. Students are asked to interact in written English with a degree of fluency that makes regular interactions with native English speakers quite possible with some strain. They are also prepared to produce clear, detailed written texts on a limited range of subjects and explain a viewpoint on a topical issue giving the advantages and disadvantages of a few options. In addition, this course promotes students' development of presentation skills, teamwork ability, and learner autonomy by engaging them in various interactive activities.

Textbooks:

Rogers, L., & Zemach, D. E. (2024). *Skillful 3 Reading and Writing* (3rd ed.). Macmillan Education.

Introduction to Automation and Control Engineering Technology

Credits: 3

Prerequisites: None

Course Description: This course provides students with knowledge about automation and control engineering technology, including roles, positions, and missions of an engineer in this field. It also provides a training field for students and offers an introduction to the technology applied in the field of automation and control.

Textbook:

1) Horowitz, P., and W. Hill. *Art of Electronics*. 3rd ed., Cambridge University Press, 2015.

Reference books:

1) Harris, David Money, and Sarah L. Harris. *Digital Design and Computer Architecture*. Morgan Kaufmann Publishers, 2007.

2) Moura, Luis, and Izzat Darwazeh. *Introduction to Linear Circuit Analysis and Modelling: From DC to RF*. Newnes, 2005.

3) Patterson, David A., and John L. Hennessy. *Computer Organization and Design: The Hardware/Software Interface*. 4th ed., Morgan Kaufmann, 2008.

4) Storey, Neil. *Electronics: A Systems Approach*. 4th ed., Prentice Hall, 2009.

C Programming Language

Credits: 3

Prerequisites: None

Course Description: This course provides an introduction to computing and program development in the C programming language with a brief introduction to basic computer concepts while studying the syntax and semantics of the basic control structures of C, learning C's fundamental data types, structures, and pointer, understanding the design and methodical construction of computer programs, learning how to test and debug programs, etc.

Textbook:

1) Deitel, Paul, and Harvey Deitel. *C: How to Program*. 7th ed., Pearson, 2012.

Mathematical Statistics for Engineers

Credit: 4

Prerequisites: Calculus 1

Course Description: This course provides the learner with an understanding of the descriptive statistics, fundamental probability, random variables and probability distribution laws, characteristics of random variables, parameter estimation, hypothesis testing, regression, and analysis of variance.

Textbook:

1) Devore, Jay L. *Probability and Statistics for Engineering and Science*. 8th ed., Cengage Learning, 2011.

Electrical Circuits

Credit: 4

Prerequisites: Calculus 1 & Physics 1

Course Description: This course provides the learner with an understanding of the following concepts: the basics of circuit analysis, established circuit under impact sine, circuit analysis methods, circuit theorems, two-port network, circuit analysis in time-domain, circuit analysis in the frequency domain, the frequency characteristics of the transfer function.

Textbook:

1) Svoboda, James A., and Richard C. Dorf. *Introduction to Electrical Circuits*. 8th ed., 2010.

Electronic and Electrical Materials

Credit: 2

Prerequisites: Chemistry, Physics 1, and Mathematics Foundation Executive

Course Description: This course provides the learner with the following contents: technology type, manufacturing electrical materials, electronic materials featuring electrical com in the electricity sector, electronics, the electrical, mechanical, chemical nature of materials: conductive, insulating, superconductors, semiconductors and power flow control properties.

Textbook:

1) Jones, Ian P. *Materials Science for Electrical and Electronic Engineers*. Oxford University Press, 2001.

Reference books:

1) Callister, W. D. *Materials, Science and Engineering*. Willey, 2000.

2) Morgan, D. V., and K. Board. *An Introduction to Semiconductor Microtechnology*. Wiley, 2002.

- 3) Ohring, M. *Engineering Materials Science*. Academic Press, 2001.
- 4) Shackelford, J. L. *Introduction to Materials Science and Engineering*. Prentice Hall, 2003.
- 5) Smith, W. F., and J. Hashemi. *Foundations of Materials Science and Engineering*. 3rd ed., McGraw-Hill, 2003.

Basic Electronics

Credit: 4

Prerequisites: Calculus 3 & Physics 1

Course Description: This course provides the learner with knowledge of electronic components and the structure and principles of operation of the electronic components. It enables the students to analyse and explain the principles of operation of simple electronic circuits, analyse the frequency response of the amplifier circuit, analyse and design the audio power amplifier circuits, distinguish the type of feedback, analyse and design application circuits using operational amplifier, analyse the principle of operation of the oscillator circuits, analyse and design the simple DC sources, and provide electronic circuits.

Textbooks:

- 1) Floyd, Thomas L. *Electronic Devices*. Prentice Hall, 2012.
- 2) Malvino, Albert. *Electronic Principle*. Mc Graw Hill, 2015.

Electricity in Practice

Credit: 1

Prerequisites: Electrical Safety, Electrical Circuits

Course Description: In this course, learners will be introduced to contents related to basic electrical installation technology, such as calculation method for constructing and installing, quality inspection, electrical machine installation technology, and operating common electrical machines.

Textbook:

- 1) Jackson, Herbert W., Dale Temple, and Brian E. Kelly. *Introduction to Electric Circuits Lab Manual*, 9th ed., 2013.

Digital Systems

Credit: 3

Prerequisites: Basic Electronics

Course Description: This course provides the learner with knowledge about digital systems, basic logic gate, fundamental theorem of Boolean algebra, combinational circuits, sequential circuits, basics of digital integrated circuits TTL and CMOS, characteristic parameters of digital integrated circuits, how to classify integrated circuits, the principle of changing between analog and digital signals, operational structure and application of the memory, and the principles of the digital oscillator circuit.

Textbook:

- 1) Maini, Anil K. *Digital Electronics*. John Wily & Sons, 2007.
- 2) Tocci, Ronald J., and Neal S. Widmer. *Digital Systems: Principles and Applications*. 12th ed., Prentice Hall, 2015.

Automatic Control Systems

Credit: 3

Prerequisites: Electrical Circuits, Electrical Measurement and Instruments, Complex Functions and Laplace Transforms, Basic Electronics

Course Description: This course provides the learner with knowledge of the components of an automatic control system and the method of building mathematical models of the automatic control system including: transfer function, signal graph and equation of state, the problem of control and observation, the stable survey methods of automatic control systems, survey methods of quality of control system (accuracy, time domain, frequency

domain), and the design methods of automatic control system.

Textbooks:

- 1) Golnaraghi, Farid, and Benjamin C. Kuo. *Automatic Control Systems*. 9th ed., John Wiley & Sons, Inc., 2009.
- 2) Nise, Norman S. *Control Systems Engineering*. 6th ed., John Wiley & Sons, Inc., 2010.

Electrical Machines

Credit: 4

Prerequisites: Electrical Circuits

Course Description: This course provides the learner with knowledge about basic structure, working principle, meaning of the electromagnetic relations of a DC machine, transformers, asynchronous machines, synchronous machines, special machines and electrical instruments. It also provides an understanding of the methods for calculating variables, technical parameters of electrical machines and electrical instruments, work characteristics (rule) of electrical machines and electrical instruments, the method of implementation, and control modes of electrical machines and electrical instruments.

Textbook:

- 1) Sen, P. C. *Principles of Electrical Machinery and Power Electronics*. 2nd ed., John Wiley & Sons, Inc. 1997.

Reference books:

- 1) Fitzgerald, A. E., C. Jr. Kingsley, and C. D. Umans. *Electrical Machinery*. 6th ed., McGraw-Hill, 2003.
- 2) Kelemen, J. A. *ECE 3300 Laboratory Manual*. 2nd ed WMU IEEE Student Branch, 2003.
- 3) Say, M. G. *Alternating Current Machines*. 5th ed., Halstead Press, John Wiley & Sons, Inc., 1983.

Instrumentation and Sensors

Credit: 3

Prerequisites: Electrical Circuits

Course Description: This course provides the learner with knowledge about concept of measurement, electrical measurement and sensors, measurement of electrical quantities structure, the method of measuring the electrical quantities such as current, voltage, resistance, capacitance, inductance, frequency, phase angle, power, how to analyze and estimate measurement errors and understand the principles and operation of the electrical measurement system, the measuring instruments, as well as the principle of sensors and its applications in the industry.

Textbooks:

- 1) Loughlin, C. *Sensors for Industrial Inspection*, Springer, 1993.
- 2) Purkait, P., et al. *Electrical and Electronics Measurements and Instrumentation*. McGraw Hill, 2013.

Power Supply System

Credit: 3

Prerequisites: Electrical Circuits, Electric-Electronic Instruments; Electronic Measurement and Instrumentation; Electrical Safety

Course Description: This course equips learners with knowledge about the method for determining the load calculation and the ability to calculate voltage loss, power loss, and short circuit calculations, as well as select the number and transformer capacity. The students are also introduced to the concepts of diagrams distribution substations and redundant power, function and operating principle of the switchgear, medium and low voltage protection, the method selected conductors, cables, switchgear protect-sectioning measurement, distribution cabinet low and medium voltage, offset low voltage network power plant, and industrial lighting calculations.

Textbook:

1) Sivanagaraju, S. *Electric Power Transmission and Distribution*. Pearson, 2008.

Reference books:

1) Gonen, T. *Electric Power Distribution Engineering*. 3rd ed., 2008.

2) McDonald, John D. *Electric Power Substations Engineering*. CRC Press, 2012.

3) Miller, Robert, and James Malinowski. *Power System Operation*. 3rd ed., McGraw Hill, 1994.

4) Pansini, Anthony J. *Electrical Distribution Engineering*. 3rd ed., Fairmont Press, 2006

5) Short, T. A. *Electric Power Distribution Equipment and Systems*. CRC Press, 2004.

Basic Electronics in Practice

Credit: 2

Prerequisites: Basic Electronics

Course Description: In this course, learners will be introduced to instruments in electronics and will engage in the following practical activities: recognition of basic electronic components such as R, L, C, diode, BJT, FET, Opam; verification of basic application circuits of the electronic components in theory and reality, analysis of circuit operation, and analysis of operation of basic electronic circuit.

Textbook:

1) Kybett, Harry, and Earl Boysen. *All New Electronics Self-Teaching Guide*. 3rd ed., Wiley Publishing, Inc. 2008.

Microprocessor

Credit: 3

Prerequisites: Digital Systems

Course Description: This course provides the learner with knowledge about the role and functions of a processor and the processor system; historical development of processor generations, the basic parameters to assess the ability of the processor; the structure and role of the components in the block diagram of 8-bit microprocessors, principles of operation of 8-bit microprocessors; historical development of microcontrollers, advantages and disadvantages of using microcontrollers, internal and external structure of 8-bit microcontroller; function of peripheral devices: timer/counter, interrupts, data transfer of microcontroller, assembly language, C language to program a microcontroller.

Textbooks:

1) Barnett, Richard H., Sarah Cox, and Larry O'Cull. *Embedded C Programming and the Microchip PIC*. Delmar Publishers Inc., 2003.

2) Bates, Martin P. *PIC Microcontrollers: An Introduction to Microelectronics*. 3rd ed., Newnes, 2011.

Power Electronics

Credit: 3

Prerequisites: None

Course Description: This course provides learners with specialized knowledge of basic power electronic accessories. The students will be introduced to the following topics: the structure, operating principles, waveform and parameters, the uncontrolled and controller rectifier circuits, modified circuit, switching voltage AC, transforming DC voltage, inverting and selecting the DC power supply.

Textbook:

1) Mohan, N., T. M. Undeland, and W. P. Robbins. *Power Electronics: Converters, Application and Design*. 3rd ed., John Wiley, 2002.

Automatic Electric Drive

Credit: 3

Prerequisites: Advanced Mathematics, Computer Science Basic, Electric, Electric Tools, Basic Electronics, Power Electronics

Course Description: This course introduces students to the content related to the characteristics of the electric drive system, methods of adjusting the motor speed, direct current and alternating current, the calculation method features, engines in the different working state, characteristic construction methods, and instructs students on how to choose equipment for power transmission and working principles of the new powertrain.

Textbook:

- 1) El-Sharkawi, Mohamed A. *Fundamentals of Electric Drives*. Brooks/Cole, 2000.
- 2) Nisit, K. D., and Prasanta K. Sen. *Electric Drives*. India, Prentice-Hall, 1999.
- 3) Veltman, Andre, Duco W. J. Pulle, and R. W. de Doncker. *Fundamentals of Electrical Drives*. Springer International Publishing, 2016.

Electrical Machine in Practice

Credit: 2

Prerequisites: Electrical Machine

Course Description: In this course, the students will take part in practical work in the following areas related to electrical machines: installation technology of basic electricity, calculation method for constructing and installing, quality inspection, repairing, installing technology of electrical machine, manufacturing technology of winding in detail, assembling and operating common electrical machines.

Textbook:

- 1) Chaturvedi, D. K. *Electrical Machines Lab Manual with MATLAB Programs*. I K International Publishing House, 2015.
- 2) Kothari, D. P., and B. S. Umre. *Laboratory Manual for Electrical Machines*. I K International Publishing House, 2014.

Programmable Logic Controller

Credit: 3

Prerequisites: None

Course Description: This course provides students with contents regarding the method for determining the output of the sensors, how to calculate the value of output as required, the type of sensor connection and actuators with PLC controllers, functional and operational principles of PLC, and application scripts.

Textbook:

- 1) Bryan, L. A., and E. A. Bryan. *Programmable Controllers: Theory and Implementation*. 2nd ed., American Technical Publishers, 2002.
- 2) Jack, Hugh. *Automation Manufacturing Systems with PLCs*. April 14, 2005.

Digital Systems in Practice

Credit: 1

Prerequisites: Electricity in Practice and Electronics in Practice

Course Description: This course instructs students on how to use digital electronic circuits such as logic gates, Flip-Flops, counters, registers, integrated circuit designs and sequential circuits, memory ICs, ADC, DAC circuits, and applications.

Textbook:

- 1) Maini, Anil K. *Digital Electronics*. John Wiley & Sons, 2007.
- 2) Tocci, Ronald J., and Neal S. Widmer. *Digital Systems: Principles and Applications*. 12th ed., Prentice Hall, 2015.

Power Electronics in Practice

Credit: 2

Prerequisites: Basic Electronics, Electronic and Electrical Materials

Course Description: This course provides learners with knowledge about the installation of circuits, operating of circuits, waveforms of circuits, DC-DC converter, DC-AC converter, AC-DC converter, and IGBT. The learners will be able to recognise and repair faults in the power electronics system, and design PWM circuits.

Textbook:

1) Arora, O. P. *Power Electronics Laboratory: Theory, Practice, and Organization*. Alpha Science International Ltd., 2006.

Supervisory Control and Data Acquisition

Credit: 3

Prerequisites: Electrical Circuits, Electrical Machine-Instrument; Electrical Measurement and Instrument; Programmable Logic Controller

Course Description: The course content provides knowledge of the following concepts: components of SCADA in automatic system; actuator system; input/output remote terminal units (RTU) or Programmable Logic Controllers, center monitor and control station; communication system; Human-Machine Interface (HMI); hardware and software integrated method, in order to build a SCADA system in practice.

Textbook:

1) Maurizio, Di Paolo Emilio. *Data Acquisition Systems: From Fundamentals to Applied Design*. Springer, 2013.

2) Radvanovsky, Robert, and Jacob Brodsky. *Handbook of SCADA/Control Systems Security*. 2nd ed., CRC Press, 2013.

Project on Programmable Logic Controller

Credit: 1

Prerequisites: Programmable Logic Controller

Course Description: This course provides the opportunity for solving some practical problems in the field of automation, including designing PLC and the process as automated packaging systems, traffic light systems, conveyor systems, heat oven system, conveyor control systems, drive systems, and systems related to temperature, pressure, flow, level, and volume.

Textbooks:

1) Bryan, L. A., and E. A. Bryan. *Programmable Controllers: Theory and Implementation*. 2nd ed., American Technical Publishers, 2002.

2) Jack, Hugh. *Automation Manufacturing Systems with PLCs*. April 14, 2005.

3) Johnson, Curtis D. *Process Control Instrumentation Technology*. 8th ed., Pearson New International Edition, 2014.

Microprocessor in Practice

Credit: 2

Prerequisites: Electricity in Practice and Electronics in Practice

Course Description: This course gives students hands-on experience programming the microcontroller used to control objects to display information such as LED, LED 7-segment, LCD, GLCD, and matrix LED. The students will also get the opportunity for practical work related to the input objects such as buttons, keyboard matrix, temperature sensors, distance measurement sensor, motion sensor, and communication devices such as standard I2C real-time clock, serial EEPROM memory, ADC/DAC, as well as counting pulses and counter, timing control and timer, step motor and DC motors control, and PWM modulation.

Textbooks:

1) Barnett, Richard H., Sarah Cox, and Larry O' Cull. *Embedded C Programming and the Microchip PIC*. Delmar Publishers Inc., 2003.

2) Bates, Martin P. *PIC Microcontrollers. An Introduction to Microelectronics*. 3rd ed., Newnes, 2011.

Programmable Logic Controller in Practice

Credit: 2

Prerequisites: Programmable Logic Controller

Course Description: This course provides learners with knowledge about sensors

connecting to controllers. The learners will get the opportunity to design and choose programmable equipment and program for demanding industrial systems.

Textbooks:

- 1) Anderson, Gary D. *PLC Programming Using RSLogix 500: Ladder Logic Diagnostics & Troubleshooting*. CreateSpace Independent Publishing Platform, 2015.
- 2) Pawla, Andrzej M. *Sensors and Actuators in Mechatronics: Design and Applications*. CRC Press, 2006.

CAD for Automation and Control Engineering

Credit: 3

Prerequisites: Electrical Circuits, Electrical Machines

Course description: This course introduces the learner to the basic principles of design and simulation, CAD applications, the method of solving problems of specialized techniques in design, creating electrical technical drawings, etc.

Textbook:

- 1) Eplan user guide, 2017
- 2) Visio 2010

Automatic Control System in Practice

Credit: 2

Prerequisites: Automatic Control System, Microprocessor

Course Description: This course provides the learner with an understanding of how to survey and control automatic control systems including temperature control, pressure control, flow control, control position and velocity. It also provides knowledge of process control, the effect of the additional stage of an automatic control system, and the method of communication in an automation control system.

Textbook:

Embedded Systems

Credit: 3

Prerequisites: Microprocessor, Programmable Logic Controller

Course Description: This course provides students with basic knowledge of embedded systems, including the basic concepts of embedded systems, the properties of embedded applications; basic components of an embedded system; embedded system design process; ARM microcontroller; ARM instruction set; C programming language for embedded systems; and embedded programming for arm microcontroller.

Textbooks:

- 1) Crowley, Patrick, and Peter Barry. *Modern Embedded Computing – Designing Connected, Pervasive, Media-Rich Systems*. Morgan Kaufmann Publishers, Inc., 2012
- 2) Lee, Edward A., and Sanjit A. Seshia. *Introduction to Embedded Systems – A Cyber-Physical Systems Approach*. MIT Press, 2014.

References:

- 1) Vahid, Frank, and Tony Givargis. *Embedded System Design: A Unified Hardware/Software Approach*. John Wiley & Sons Inc., 2002.
 - 2) Valvano, Jonathan W. *Embedded Systems: Introduction to Arm®. Cortex(TM)-M Microcontrollers (Volume 1)*. 5th ed., CreateSpace Independent Publishing Platform, 2012.
 - 3) Valvano, Jonathan W. *Embedded Systems: Real-Time Interfacing to Arm®. Cortex™-M Microcontroller*. 2nd ed., CreateSpace Independent Publishing Platform, 2012.
- Yiu, Joseph. *The Definitive Guide to the ARM Cortex-M3*. Elsevier Newnes, 2007.

Electrical Equipment and Pneumatics

Credit: 3

Prerequisites: Electrical Machines - Electrical Equipment

Course Description: This course provides students with basic knowledge about the

elements of electrical equipment, electronics, pneumatics, inverters, control circuit terminals, control inverter, control of machine tools, etc.

Textbook:

Measurement and Control by Computer

Credit: 3

Prerequisites: Microprocessor, Automatic Control System

Course Description: This course provides students with basic knowledge about the structure, system, and method of communication between computers with peripherals used in the field of measurement, monitoring, and automatic control.

Textbook:

FMS and CIM

Credit: 3

Prerequisites: None

Course Description: This course provides students with basic knowledge about FMS and CIM in automation, such as automatic feeders, automatic processing, automatic assembly, and automatic storage.

Textbook:

Intelligent Control

Credit: 3

Prerequisites: Automatic Control System

Course Description: This course introduces the learner to the initial intelligent control systems, logic synthesis and application of control systems, neural network training algorithm with applications in the synthesis of automatic control systems, control scheme combined with logic trends, neural networks, and genetic algorithms in intelligent control systems.

Textbook:

Image Processing in Industry

Credit: 3

Prerequisites: Modelling and Computer Simulations, Automatic Control System, Microprocessor, Robot Technology

Course Description: This course provides the learner with the following contents: fundamentals of image processing, noise removal, smoothing, edge detection, color recognition, segmentation, and motion detection. Besides, students will be introduced to the ideas of applying image processing to a real-life situation.

Textbook:

1) Gonzalez, R. C., and R. E. Woods. *Digital Image Processing*. 3rd ed., Pearson, 2007.

Robotics in Practice

Credit: 1

Prerequisites: Robotics

Course Description: This course provides the learner with a practical understanding of robotics, types of suture joints in robots, robot sensors, and robot programming.

Textbook:

11. Program Implementation Guidelines

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 - 45 hours of laboratory work or practical exercises
- 1 credit = 30 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.

Political Theory Knowledge: Implemented according to the regulations of the Ministry of Education and Training.

Foreign Language Knowledge: The foreign language output standard is determined by the university's Science and Training Council at the beginning of each admission cohort. Throughout their studies, the university will monitor the students' foreign language proficiency development each academic year to decide the number of credits for courses that students are allowed to register for in a semester. Students can self-study or register for the foreign language proficiency development program according to the university's plan.

Physical Education Knowledge: Implemented according to the regulations of the Ministry of Education and Training. For Physical Education 2 and 3, students can select from the course catalog when registering for modules.

National Defense Education Knowledge: Implemented according to the regulations of the Ministry of Education and Training. Students accumulate credits and are granted a certificate after completing the requirements of the module.

Elective Social Sciences and Humanities Knowledge: Students select 2 courses, equivalent to 4 credits, from the course catalog when registering for modules.

Elective Foundational Major Knowledge: Students select 2 courses, equivalent to 6 credits, from the course catalog when registering for modules.

Elective Specialized Major Knowledge: Students select 2 courses, equivalent to 6 credits, from the course catalog when registering for modules.

The remaining knowledge blocks are arranged into 8 semesters as presented in section 8.

VICE PRESIDENT

**DEAN OF FACULTY
OF INTERNATIONAL EDUCATION**

Dr. Quach Thanh Hai

Assoc. Prof. Dr. Truong Dinh Nhon