

THAI NGUYEN UNIVERSITY
UNIVERSITY OF INFORMATION
AND COMMUNICATION TECHNOLOGY



PROGRAMME SPECIFICATION
MAJOR: AUTOMATION AND CONTROL ENGINEERING TECHNOLOGY
SPECIALIZATION: AUTOMATION UNDERGRADUATE PROGRAM

*(Issued in Decision No. 809/QĐ-ĐHCNT&TT dated 01/8/2017
by President of the University of Information and Communication Technology)*

THAI NGUYEN, 2017

PROGRAMME SPECIFICATION

(Issued under Decision No. 809/QĐ-ĐHCNTT&TT dated on 01/8/2017 by Rector of the University of Information and Communication Technology)

Program name: Engineer degree in Automation and Control Engineering Technology

Education level: Bachelor's degree

Training major: Automation and Control Engineering Technology

Sector code: 52510303

Specialization: Automation undergraduate program

Programme Type: Full-time

Degree Name: Engineer degree in Automation and Control Engineering Technology

Degree awarded by: University of Information and Communication Technology - Thai Nguyen University.

Teaching institution: Faculty of Automation Technology - University of Information and Communication Technology - Thai Nguyen University.

1. Training Objectives

1.1. General objective

Training automation engineers in the field of Automation and Control Engineering Technology towards the goal of training human resources to meet the needs of our society, with in-depth knowledge of electrical and electronic engineering, measure, power electronics, electric machine, PLC control, SCADA and production automation. Helping students who have professional ethics, health, ability to independently research and work in groups, ability to communicate and present specialized issues in English.

1.2. Detail goal

1.2.1. About knowledge

- Understand the fundamental knowledge of mathematics and physics to solve theoretical and practical problems related to the industry and major.
- Understand the basic of the theory of Marxism-Leninism, Ho Chi Minh's Ideology, the contents of the Revolutionary Way of the Communist Party of Vietnam, the law of the state, security - defense.
- Apply fundamental knowledge of electronic and electrical engineering, control theory, electrical machines, ... and the quality criteria of control and automation systems to reason and solve theoretical and practical problems in the automation field.
- Apply specialized knowledge to the operation, exploitation and maintaining small and medium-sized industrial control systems, service and public systems, PLC system, microprocessor, mini SCADA, industrial production lines.
- Analyze, model design, microcontroller programming, industrial programming for control circuits, machines and production lines: drives of robots, machine tools and CNC, industrial lines.
- Repair, operation and inspection of electrical equipment (AC generators, DC generators and transformers), measuring and control equipment in industry and civil engineering;

- Formulate ideas, propose solutions for control systems, flexible production modules, process control systems with control, monitoring and data collection functions; propose and implement energy management and power saving solutions.

1.2.2. About skills

- Have ability to competently use the necessary tools and specialized software to solve problems related to the discipline and specialized training.

- Have the skills to work independently and in groups; write reports, give presentations on technical issues.

- Have the capacity to lead on the trained professional; proposing initiatives in performing assigned tasks; have the ability to self-study, accumulate knowledge and experience to improve professional qualifications; have the capacity to plan, coordinate and promote collective wisdom; have an understanding of professional responsibility and professional ethics.

- Achieve one of the following certificates: IC3, MOS, ICDL, Certificate of Information Technology Application (according to Circular 03/2014/TT-BTTTT of the Ministry of Information and Communications)

- Achieve a foreign language level 3/6 (English) foreign language competence framework of Vietnam; skills in using specialized English

1.2.3. Moral qualities, attitudes

Honest, responsible, careful, meticulous, withstand high work pressure; Have good qualities, passion to work and research in the field of automation.

1.2.4. Autonomy and responsibility

Professional autonomy and high responsibility in work

2. Training time

4.5 years spread over 9 semesters.

3. The volume of knowledge of the whole course

- The amount of knowledge of the whole course: 140 credits (*excluding the modules of Physical Education, Defense - Security*).

- Structure of the training program

No.	Knowledge group	Credits
1	General knowledge	38
1.1	Political Science: 10 credits	
1.2	Natural/Social Science, Informatics: 16 credits	
1.3	Foreign language: 12 credits	
2	Disciplinary foundational knowledge	43
3	Specialized knowledge + Compulsory: 27 credits + Elective: 10 credits	37
4	Internship/Graduation project + Compulsory: 22 credits + Elective: 0 credits	22
Total		140

4. Admission Criteria

According to the general regulations of the Ministry of Education and Training, Thai Nguyen University and University of Information and Communication Technology.

5. Training process, graduation conditions

5.1. Training method

According to the credit system (Regulated by the Ministry of Education and Training).

5.2. Organize classes

According to the current credit training regulations of the Ministry of Education and Training, Thai Nguyen University, University of Information and Communication Technology.

5.3. Graduation conditions

Applying university training regulations according to the credit system of the Ministry of Education and Training, Thai Nguyen University, University of Information and Communication Technology.

6. Score scale

Evaluation according to the training scale according to the credit system, prescribed by the Ministry of Education and Training.

7. Career prospects: job opportunities/employment units (companies)

- Working as an engineer to design software for automatic system control; testing, operating, inspecting and accepting projects on automatic control lines at companies and factories;
- Researching and teaching in research institutes, in training institutions (colleges and universities), vocational training related to automation solutions.
- Working as a manager, designer, operator, technical director in foreign joint-venture companies, facilities with modern production lines with high-level automation and control systems.
- Working as an expert at meteorological Departments, measurement and inspection centers of provinces such as: Department of Science and Technology; Provincial Metrology Sub-Department; the metering, measuring and testing rooms of the Electricity Company; automatic measurement workshops of factories;
- Working as an engineer, manager, operator at consulting companies, designing production lines, automation systems ; Companies and factories have automatic system applications in production...
- Working as an engineer, technical manager at thermal and hydroelectric power plants, consulting and electrical construction companies; electricity transmission and distribution companies;
- Continue to study and research in-depth specialties at the graduate training level such as : Automation, the fields of production management and administration.

8. Methods of teaching, learning and assessment

- Teaching associated with reality and social needs; student-centered.
- Contact companies and businesses for students to have the opportunity to go to practice and experience the working environment.

- Receiving periodic feedback from employers, experts, alumni and lecturers to adjust training programs accordingly.
- Teaching through continuously organize learning activities , thereby helping students discover the unknown, applying creatively knowledge to learning situations. or practical situations, do not passively absorb pre-arranged knowledge.
- Teaching focuses on self-study methods for students
- To strengthen the coordination of individual learning with cooperative learning, enabling students to discuss and work in groups more.
- Combining teacher 's assessment with students self-assessment to develop students self-assessment and mutual assessment skills in many forms (such as following sample answers/answers, following instructions, or self-determination. criteria ...) to be able to criticize, find the causes and suggest ways to correct the errors.

**THE CORRELATION MATRIX BETWEEN MODULES IN TRAINING
PROGRAM WITH THE PROGRAM LEARNING OUTCOMES**

Major: Automation and Control Engineering Technology

Specialization: Automation undergraduate program

I. Program learning outcomes (Expected learning outcomes)

(a) Standard 1

Understand the fundamental knowledge of mathematics and physics to solve theoretical and practical problems related to the industry and major.

(b) Standard 2

Understand the basic of the theory of Marxism-Leninism, Ho Chi Minh's Ideology, the contents of the Revolutionary Way of the Communist Party of Vietnam, the law of the state, security - defense.

(c) Standard 3

Achieve a foreign language level 3/6 (English) foreign language competence framework of Vietnam; skills in using specialized English

(d) Standard 4

Apply fundamental knowledge of electronic and electrical engineering, control theory, electrical machines, ... and the quality criteria of control and automation systems to reason and solve theoretical and practical problems in the automation field.

(e) Standard 5

Apply specialized knowledge to the operation, exploitation and maintaining small and medium-sized industrial control systems, service and public systems, PLC system, microprocessor, mini SCADA, industrial production lines.

(f) Standard 6

Analyze, model design, microcontroller programming, industrial programming for control circuits, machines and production lines: drives of robots, machine tools and CNC, industrial lines.

(g) Standard 7

Repair, operation and inspection of electrical equipment (AC generators, DC generators and transformers), measuring and control equipment in industry and civil engineering;

(h) Standard 8

Formulate ideas, propose solutions for control systems, flexible production modules, process control systems with control, monitoring and data collection functions; propose and implement energy management and power saving solutions.

(i) Standard 9

Have ability to competently use the necessary tools and specialized software to solve problems related to the discipline and specialized training.

(j) Standard 10

Have the skills to work independently and in groups; write reports, give presentations on technical issues.

(k) Standard 11

Have the capacity to lead on the trained professional; proposing initiatives in performing assigned tasks; have the ability to self-study, accumulate knowledge and experience to improve professional qualifications; have the capacity to plan, coordinate and promote collective wisdom; have an understanding of professional responsibility and professional ethics.

(l) Standard 12

Achieve one of the following certificates: IC3, MOS, ICDL, Certificate of Information Technology Application (according to Circular 03/2014/TT-BTTTT of the Ministry of Information and Communications)

II. The correction matrix between modules in training program with the program learning outcomes.

General education knowledge													
No.	Course	Program learning outcomes											
		(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)
Compulsory Courses:													
1	English 1			x			x				x		
2	Fundamental principles of Marxism and Leninism 1		x								x		
3	Linear algebra	x											
4	General Informatics	x											
5	General Physics	x											
6	English 2			x			x						
7	Calculus	x											
8	Fundamental principles of Marxism and Leninism 2		x								x		
9	General Law		x								x		
10	Ho Chi Minh's Ideology		x								x		
11	English 3			x			x						
12	English 4			x			x						
13	Soft skills						x		x	x	x	x	x
14	Revolutionary line of the Communist Party of Vietnam		x								x		
Disciplinary foundational knowledge													
No.	Course	Program learning outcomes											
		(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)
Compulsory Courses:													
1	Technical drawing and Autocad				x		x			x	x	x	

2	Applied mechanics				x						x	x	
3	Electrical circuit theory				x	x			x		x	x	
4	C programming for engineering					x				x	x	x	x
5	Electronic Engineering				x	x					x	x	
6	Automatic control theory				x				x		x	x	
7	Electrical safety				x				x		x	x	
8	Power electronics				x		x				x	x	
9	Electrical machines and instruments				x	x		x			x	x	
10	Measurement and control techniques by computer 1				x	x	x				x	x	
11	Electric drive	x			x						x	x	
12	Measuring and sensing techniques	x			x						x	x	
13	Power Supply System				x		x				x	x	
14	PLC industrial programming technique				x					x	x	x	
Specialized knowledge													
No.	Course	Program learning outcomes											
		<i>(a)</i>	<i>(b)</i>	<i>(c)</i>	<i>(d)</i>	<i>(e)</i>	<i>(f)</i>	<i>(g)</i>	<i>(h)</i>	<i>(i)</i>	<i>(j)</i>	<i>(k)</i>	<i>(l)</i>
Compulsory Course:													
1	Hydraulic and pneumatic drives				x				x		x	x	
2	Simulation of electrical systems in industry		x	x	x	x					x	x	
3	Measurement and control techniques by computer 2	x					x	x		x	x	x	
4	Industrial Communication Engineering		x			x			x		x	x	
5	Industrial robotics		x				x	x	x		x	x	
6	Practice for pairing and industrial programming					x			x		x	x	
7	Intelligent control system	x	x			x	x	x	x	x	x	x	
8	Process control	x					x	x	x		x	x	
9	Electrical and electronic equipment for industrial machines				x	x		x	x		x	x	
10	SCADA systems and applications		x	x		x			x	x			
Elective Courses:													
	<i>Elective 1</i>		x										
1	Building apps on FPGA						x		x	x	x	x	
2	Application of image processing in industry						x		x	x	x	x	
3	Magnetic strip card, RFID code and barcode in application						x		x	x	x	x	
	<i>Elective 2</i>			x	x	x							
1	AC motor inverter control							x	x		x	x	
2	Numerical control for electric drive							x	x				
3	Sensors in automatic control						x		x				

	<i>Elective 3</i>		x					x					
1	Advanced PLC programming					x		x			x	x	
2	Production process automation								x		x	x	
3	Distributed Control System (DCS)								x				
	<i>Elective 4</i>			x	x			x					
1	Electromechanical systems								x		x	x	
2	Advanced automatic control						x		x				
3	Automation in agriculture						x		x				
Internship/Graduation project													
No.	Course	Program learning outcomes											
		(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)
Compulsory Courses:													
1	Basic Internship				x	x			x		x	x	
2	Specialized Internship						x	x	x				x
3	Graduation internship							x	x	x			x
4	Electric Drive Project				x			x					x
5	Automation system design project						x		x		x	x	x
6	Graduation project					x	x	x	x	x	x	x	x

III. Description of Courses

	Course name	Description
I. DESCRIPTION OF COURSES (General education knowledge)		
1	English 1	The course equips students with basic grammar knowledge such as how to use to be, singular nouns, plural nouns., adverbs of frequency, present simple, and provide vocabulary related to topics such as personal information, family, everyday objects, colors, how to say hours, leisure time, In addition, students are trained to evenly develop four skills of listening, speaking, reading and writing, especially basic communication skills. At the same time, it is asymptotic to the standard exam format B1.
2	Fundamental principles of Marxism and Leninism 1	Briefly introduce Marxism-Leninism and some general problems of the subject; Dialectical materialism; Dialectical materialism; Historical materialism
3	Linear algebra	To provide basic knowledge about linear algebra such as: Sets and mappings, Matrixes and determinants, Systems of linear equations, Vector spaces, Linear mappings
4	General Informatics	The course aims to equip students to understand the structure of computers, how to process information on electronic computers; familiar with Windows operating system and basic operations on windows operating system; to exploit utilities and resources on the network; to learn about PASCAL programming language, advanced programming and install some applied problems.

	Course name	Description
5	General Physics	To equip student with basic knowledge of General Physics of Electromagnetic, Optical, Wave; to understand physical phenomena in nature, to practice calculation skills and solve basic physics problems
6	English 2	The course equips students with basic grammar knowledge such as countable nouns, uncountable nouns, simple past tense, present continuous tense, comparative levels of adjectives, and system equipment. Vocabulary related to topics about Food, Money, Journeys and Appearance. In addition, students are trained to evenly develop the four skills of listening, speaking, reading, and writing and at the same time approaching the standard exam format B1
7	Calculus	To provide basic knowledge of analysis such as: Functions and limits of functions, Differential calculus of functions of one variable, Calculus of primitive functions of one variable, Definite integrals, Series
8	Fundamental principles of Marxism and Leninism 2	The central content of the economic theory of Marxism-Leninism on the capitalist mode of production: Chapter I: Theory of value; Chapter II: Theory of Surplus Value; Chapter III: Economic theory of monopoly capitalism and state monopoly capitalism. The basic content belongs to the theory of Marxism - Leninism on socialism; overview of real and prospective socialism; The historical mission of the working class and the socialist revolution; The socio-political issues of regularity in the process of socialist revolution; Realistic and prospective socialism.
9	General Law	To equip with basic and important contents about the state and law as well as mention some basic branches of law in Vietnam today
10	Ho Chi Minh's Ideology	Providing systematic insights into Ho Chi Minh's ideology, morality and cultural values; Basic knowledge of Marxism-Leninism
11	English 3	The course equips students with basic grammar knowledge such as how to use the near future tense, present perfect tense, should/shouldn't, have to/don't have to, can/can't, will/won't and equipped with a vocabulary system related to the topics of Film and the Arts, Science, Tourism and the Earth. In addition, the subject continues to help students become familiar with and competently approach diverse communication situations and evenly develop intermediate-level listening, speaking, reading and writing skills. In addition, students have access to exercise formats according to the standard test format of foreign language ability equivalent to level 3.
12	English 4	The course equips with grammar knowledge at A2+ level and approaching B1 level (Level 3) such as type 1 conditional sentences, past continuous, passive sentences.... At the same time, the course provides a vocabulary system related to the topics of means of transport, health, tourism, technology, etc. Besides, the subject continues to help students familiarize themselves with and have proficient access to the topics. diverse communication situations and uniform development of listening, speaking, reading and writing skills at pre-intermediate level (B1). In addition, students are reviewed with

	Course name	Description
		exercises in the format of a standardized test of foreign language ability equivalent to level 3 (B1).
13	Soft skills	The course provides students with teamwork skills, planning work in the most optimal way.
14	Revolutionary line of the Communist Party of Vietnam	To provide students with the basic contents of the Revolutionary Line of the Communist Party of Vietnam, which mainly focuses on the Party's line in the renovation period on a number of basic areas of the restored social life. service for life and work.

II. DESCRIPTION OF COURSES (Disciplinary foundational knowledge)

No.	Course name	Description
1	Technical drawing and Autocad	The course provides basic concepts as well as how to present, read and understand a technical drawing. Thereby students understand the specifications of a technical drawing, know how to draw (by hand) and represent objects with its projections, understand and draw technical drawings in the field of industrial electricity, apply AutoCAD software to draw on computers.
2	Applied mechanics	The Applied Mechanics course equips non-mechanical students with basic knowledge of kinematics, statics, and solving problems on deformed solid mechanics. The knowledge contents of the module include the basics of machine mechanics, the laws of statics, problems in the plane force system and the space force system. In addition, the knowledge of 4 basic types of deformation: tensile (compression), bending, torsion and the combination of these deformations are also provided to students in this module. Therefrom, they apply this knowledge to solving problems of analyzing and synthesizing structures, calculating and designing basic machine parts and structures in engineering.
3	Electrical circuit theory	This course provides learners with basic content on circuit analysis, circuits established under sine action, methods of circuit analysis, circuit theorems, two-door networks, circuit analysis in the time domain, circuit analysis in In the frequency domain, the frequency characteristics of the transfer function can be plotted.
4	C programming for engineering	This course aims to provide students with basic knowledge of the C programming language and its application in the fields of electronics. Thereby students can have an overview of programming in embedded systems, programming with microcontrollers, microprocessors.

	Course name	Description
5	Electronic Engineering	To provide students with knowledge about various types of electronic components, present the structure and operating principles of electronic components, analyze and explain the operating principles of basic applied electronic circuits. In addition, it provides students with knowledge about digital systems, basic logic gates, basic theorems of Boolean algebra, combinational circuits, sequential circuits, and the operation structure of basic digital circuits. TTL and CMOS, characteristics of digital microchips, classification of chip families, principle of conversion between analog and digital signals, operation structure and application of memory, principles of oscillation circuits.
6	Automatic control theory	To provide knowledge about components of an automatic control system, methods of building mathematical models of automatic control system including: transfer function, signal graph and state equation, controllable and observable problems, methods of investigating the stability of automatic control systems, methods of surveying the quality of control systems: accuracy, time domain, frequency domain and other automatic control system design method so that the system is stable and achieves the set quality criteria.
7	Electrical safety	To provide learners with basic concepts of labor protection and occupational hygiene. Harm of electric current to the human body, safety analysis when people are directly and indirectly electrically touched. Analysis and calculation of earthing diagrams to protect people's safety, protection measures against high voltage to low voltage ingress, protection measures when working in the environment affected by frequency high number. Necessary tools and means for electrical safety and first aid when people are electrocuted.
8	Power electronics	The power electronics course equips students with knowledge about basic power electronic components, about power conversion circuits such as: AC-DC converter circuit without voltage regulation; AC - DC converter circuits with voltage regulation; Rectifier circuit with reverse current; Circuits to regulate, switch off the AC voltage; DC to DC voltage converter circuits; Inverter circuits, inverters, etc. In addition, it also provides calculation methods, design rectifier power supplies, principles of synchronous control pulse generation for SCR and specialized software for power electronics simulating circuits.
9	Electrical machines and instruments	This course equips learners with the basic contents of structure, working principle, understanding the meaning of electromagnetic relations in DC machines, transformers, asynchronous machines, synchronous machines, electric instrument. About methods of calculating quantities, technical parameters of electric machines and electrical instrument, working characteristics (laws) of electric machines and electrical instrument, methods of implementation, control working mode of electric machines and electrical instrument.

	Course name	Description
10	Measurement and control techniques by computer 1	To provide students with knowledge about microprocessor systems, microcontrollers, personal computers, connection standards, etc. students will have skills in analysis, design hardware and software for Simple measurement and control system.
11	Electric drive	To provide students with knowledge about the characteristics of electric drive systems, methods of speed regulation of DC and AC motors, methods of calculating characteristics of motors in different working states. , method of characterizing and selecting equipment for electric powertrains and working principle of new powertrains.
12	Measuring and sensing techniques	This course equips learners with knowledge about measurement concepts in general and electrical measurement in particular, understanding the principles of structure and operation of various types of indicator mechanisms, know the structure of meters, know how to measure electrical quantities such as: current, voltage, resistance, capacitance, inductance, frequency, phase angle, types of power, electricity, analyze and evaluate measurement errors, understand the principle and operation of electrical measurement systems in industry. In addition, understanding the knowledge about sensors, specifically learn about sensors: optical, thermal, displacement, velocity, acceleration, force sensor, volumetric flow, ... and applications. applications of these sensors in industry.
13	Power Supply System	This course equips learners with the contents of determining calculated loads methods, calculating voltage loss, power loss, short circuit calculation, selecting the number and capacity of transformers, schematic diagram. distribution substation map and backup power. Functions and operating principles of switchgear, medium and low voltage protection devices, methods of selecting conductors, cables, switchgear - protection - measurement, medium and low voltage distribution cabinets, compensation Factory low voltage power network capacity and industrial lighting calculation.
14	PLC industrial programming technique	The course provides the concepts of logic control; mathematical basis, methods of analysis and synthesis of combinational logic control system, sequence logic control system, some logic circuit applications in control. Overview of logic control systems using PLC, design sequence of a logic control system using Siemens PLC, programming language, programming control program for some specific application problems.
III. DESCRIPTION OF COURSES (Specialized knowledge)		
1	Hydraulic and pneumatic drives	Mechanics such as properties, properties of liquids, gases, flow modes, mathematical foundations of fluids, as a foundation for the design of fluid systems. equipment for working with liquids and gases in different modes; machines and equipment in hydraulic-pneumatic transmission systems; analysis and design of hydraulic and pneumatic transmission systems; electro-hydraulic, electro-pneumatic. The course is a module whose knowledge covers two major branches of

	Course name	Description
		automation equipment, providing students with a fuller view of automation systems in practice.
2	Simulation of electrical systems in industry	This course provides students with the content of mathematical modeling of components of electrical circuits, mode modeling, automatic systems and the sequence of simulating transient states of automatic systems; introduce simulation software and specialized applications
3	Measurement and control techniques by computer 2	To provide students with knowledge of hardware and software so that students have skills in analyzing, designing and implementing measurement and control systems using computers, including: data input and output methods with computers through interfaces; techniques for connecting computers with external modules, with microprocessors, with other computers; data storage on the computer; computer control programming; applications in measurement and control.
4	Industrial Communication Engineering	The course provides students with knowledge about: Structure and role of industrial communication network system; Technical basis of industrial communication networks; Typical bus systems; Connect network components; System integration software standards. Therefrom, students gain a deeper understanding of how information is exchanged in industrial communication systems, know how to pair devices and build systems. The course is a continuation of computer networking, specifically for industrial communication systems.
5	Industrial robotics	The course provides learners with basic knowledge of kinematics, robot dynamics; Robotic sensors and actuators; The motion control method of industrial robots helps students master some types of robots applied in industry today.
6	Practice for pairing and industrial programming	The course provides learners with knowledge about the analysis and design of control and dynamic circuits in industry. They can read and understand the circuit diagram when connecting devices to PLC, run the program on PLC S7-200 and PLC-S7-300, PLC –S7-1200. Application of all kinds of PLCs in the automation control system of some production lines.
7	Intelligent control system	The course provides learners with basic knowledge about the concepts of fuzzy logic and artificial neural networks, the application of fuzzy logic theories and artificial neural networks to control problems showned on Matlab simulation software. In addition, they learn about current systems and apply the above theory in control engineering.
8	Process control	The course introduces technological process control systems used in practice. Methods of modeling technological processes, control principles in process control systems as well as feedback control systems. The final part of the course will provide students with microprocessor-based controllers and distributed control.

	Course name	Description
9	Electrical and electronic equipment for industrial machines	The course provides learners with basic knowledge about uses, main movements, and methods of determining load, motor power for machine transmission, characteristics and requirements for electrical equipment systems. - electronics of the machine, typical control stages and some control diagrams of industrial machines in practice such as lathes, milling machines, drills, planers and transport lifting machines such as elevators, cranes, conveyors
10	SCADA systems and applications	The course provides knowledge about: components of the SCADA system in the automation system; System of actuators; Remote I/O devices RTUs (Remota Terminal Units) or PLCs (Programmable Logic Controllers), Central Supervisory Control Station; Communication system; Human-Machine Interface (HMI); How to integrate hardware and software to build a SCADA system in practice.
<i>Elective Course 1</i>		
1	Building apps on FPGA	The course provides technical learners with basic and complex digital circuit design processes in industry. To understand about programming technology such as PLA, CPLD, FPGA. Students understand VHDL (Very High Speed Integrated Circuit Hardware Description Language) for high speed integrated circuits. Therefrom, they acquire the skills to analyze and design digital electronic circuits correctly and effectively.
2	Application of image processing in industry	The course provides learners with skills in industrial image processing applications. Grasping the technology of the CNN cell neural network, the computer parallelizes CNN-UM and applies it to image processing at a speed of tens of thousands of images per second.
3	Magnetic strip card, RFID code and barcode in application	The course provides students with knowledge about identification technologies through magnetic cards, barcodes, Radio Frequency Identification and applications for automatic management of products in the industry field.
<i>Elective Course 2</i>		
1	AC motor inverter control	The course provides learners with knowledge about some common types of inverters in industry today. Inverter - AC motor coupling method. Method of controlling and stabilizing AC motor speed using inverter in some typical application.
2	Numerical control for electric drive	To provide students with knowledge of the skills to calculate, design, calibrate and analyze a three-phase asynchronous motor controller using field-oriented control (FOC) method. The knowledge of numerical control of electromechanical systems will help students design, install or operate well the inverter-driven electric drive systems that are commonly used in industry.
3	Sensors in automatic control	The course provides learners with the concepts of sensors and their applications and in automatic control systems.
<i>Elective Course 3</i>		

	Course name	Description
1	Advanced PLC programming	The course provides learners with knowledge and skills in programming some advanced PLC problems: HSC, PID, PTO/PWM, Reading Real Time... an indispensable knowledge for engineering. Automation engineer working with control systems using PLC.
2	Production process automation	To provide basic issues of automation system of technological process such as structure of system, assurance systems, role of human and computer in the system, etc.. On that basis, the process automatic system is presented as a highly evolved step of modern production systems.
3	Distributed Control System (DCS)	The course provides learners with an important knowledge of distributed structured control systems. Devices and methods of coupling devices, methods of data acquisition, control and monitoring in a distributed control system.
<i>Elective Course 4</i>		
1	Electromechanical systems	To provides students with knowledge about electromechanical systems, basic criteria of electromechanical systems, automatic adjustment of speed control of DC motors, system of speed regulation of DC motors when control multi-loop control, reversing motor valve drive system. The subject is a module where knowledge is extremely important in the automation industry, providing students with a more complete view of automation systems in practice.
2	Advanced automatic control	To provide students with basic and in-depth knowledge of new and modern techniques in engineering cybernetics: nonlinear control systems, optimal control and adaptive control.
3	Automation in agriculture	This course provides and equips students with an automation system applied in agriculture. Therefrom, They know how to apply to build design calculations to apply in practice
IV. DESCRIPTION OF COURSES (Internship/Graduation project)		
<i>Compulsory Course</i>		
1	Basic Internship	To introduce learners to gradually familiarize themselves with practical knowledge through basic practical modules
2	Electric Drive Project	To provide and consolidate basic knowledge from previous subjects, especially Electrical Drives, then students know how to systematize knowledge, research and design for specific problems assigned in the project. Thus, when they complete the Electric Drive project, students can master the knowledge of electric drives, specifically the options for selecting drives, how to choose, analyze dynamic and control circuits, select suitable electricity equipments.
3	Specialized Internship	The course synthesizes and provides students with a way to synthesize knowledge learned in the specialized block, thereby knowing how to apply it to specific objects.

	Course name	Description
4	Automation system design project	To provide and consolidate the contents of solving a number of practical problems in the field of automatic control including mathematical modeling, model parameter recognition, stability and quality analysis of the system. reality, and synthesize the controller for the actual system related to the stability of temperature, pressure, flow, position, speed, etc.
5	Graduation internship	In this course, learners perform the tasks assigned to apprentice engineers specializing in Automation at companies, factories, enterprises, and production facilities.
6	Graduation project	To equip students to perform the assigned tasks of an electrical engineer from surveying, analyzing, designing an automation system, production line, electric transmission..,at companies, factories, enterprises, production facilities.

DEAN



PhD. NGUYEN DUY MINH