THAI NGUYEN UNIVERSITY
UNIVERSITY OF INFORMATION AND COMMUNICATION TECHNOLOGY

SOCIALIST REPUBLIC OF VIETNAM
Independence - Freedom - Happiness

PROGRAMME LEARNING OUTCOMES (PLOs) OF SOFTWARE ENGINEERING EDUCATION PROGRAMME

Issued under Decision No. 415/QĐ-ĐHCNTT&TT dated on 30/06/2021 by Rector of The University of Information and Communication Technology

Major: Automation and Control Engineering Technology
Program name: Automation undergraduate program
Level of training: Undergraduate
Training period: 4/5 years

I. GENERAL INFORMATION

- Name of major: Automation and Control Engineering Technology
- Training code: 52510303
- Program name: Automation undergraduate program
- Education level: undergraduate
- Name of diploma:

+ Bachelor degree in Automation and Control Engineering Technology. Training period of 4 years; Implement PLOs [1]: L1, L2,.....L18 (except L6 and L15).
+ Engineer degree in Automation and Control Engineering Technology. Training period (4+1) years; Implement PLOs [2]: L1, L2,.....L18.

II. OBJECTIVE

2.1 Common objectives

Training bachelor's degree in Automation and Control Engineering Technology with good professional ethics; idealistic and responsible; has the ability of systematic thinking and reasoning and solving the problems of science and technology specialized in automation; be able to operate and repair/maintain automation systems; be able to design small automation systems; has capabilities of lifelong learning to adapt to the continuous development of science and technology;

With the engineering degree program, students are equipped with more specialized knowledge and skills to meet the capacity to participate in implementing, manufacturing, deploying, and evaluating technical solutions; and adapt well to different jobs in the wide field of Automation and Control Engineering Technology.

2.2 Specific objectives

✓ O1: Students have basic knowledge of basic science subjects (political theory, law, physics, mathematics…) to solve related problems in professional and life fields .

- ✓ O2: Students have foreign language and computer skills to meet the needs of working in an interdisciplinary, multicultural and multinational environment.
- ✓ O3: Students have basic knowledge technical and professional knowledge in electricity, electronics, measurement, programming, control, automation ; qualified to participate in solving related problems in the field of automation.
- ✓ O4: Students have skills in inspecting, repairing, maintaining and operating automation systems.
- ✓ O5: Students have good communication and teamwork skills ; Capable of leading interdisciplinary engineering teams to conceptualize , participate in system design , implementation and operation .
- ✓ O6: Students have personal skills and lifelong learning ability to adapt to the continuous development of science and technology.

Also for engineer:

- ✓ O7: Students are able to meet job positions in foreign-invested enterprises/ in advanced countries.
- ✓ O8: Students have the ability to think, analyze, evaluate, upgrade and develop new automation systems.

III. PROGRAM LEARNING OUTCOMES

Notation of PLO		Content of PLOs	Proficiency level
1		**Technical reasoning knowledge**	
1.1	***L1***	***Apply fundamental (basic) knowledge of social sciences and natural sciences (such as political theory, mathematics, physics) to solve related problems in professional fields, career and life.***	***2.5***
1.1.1		Apply knowledge of Marxism-Leninism, Ho Chi Minh's thought, and the Party's viewpoints to perceive scientific, technical, and technological issues; build political bravery and develop moral values, responsibility to self, family, and social community.	2.5
1.1.2		Apply fundamental knowledge of mathematics, physics, and logical thinking as the foundation for studying, researching, and solving professional and professional problems.	2.5
1.1.3		Apply knowledge of national defense and security and physical education to realize the responsibility for the cause of national defense and health training to ensure assigned tasks.	2.5
1.2	***L2***	***Achieve a foreign language level 3/6 (B1) according to the 6-level foreign language competency framework for Vietnam or other equivalent international foreign language***	***3***

Notation of PLO		Content of PLOs	Proficiency level
		certificates.	
1.2.1		Apply basic knowledge of vocabulary and grammar to meet the acquisition of professional knowledge.	3
1.2.2		Synthesize learned knowledge and language skills to listen, speak, read and write on familiar topics in life and work.	4
1.3	***L3***	***Computer skills: 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)***	***3***
1.3.1		Have basic knowledge of information technology	2
1.3.2		Have ability to use a computer at a basic level	3
1.3.3		Have ability to use word processing software at a basic level	3
1.3.4		Have ability to use Excel software at a basic level	3
1.3.5		Have ability to use Powerpoint software at a basic level	3
1.3.6		Have ability to use Internet at a basic level	3
1.4	***L4***	***Apply foundational knowledge (shared disciplinary foundational and disciplinary foundational such as electricity, electronics, measurement, control, automation) to describe, and compute and simulate technical systems, processes, and products in the field of Automation.***	***3***
1.4.1		Apply knowledge of occupational safety to ensure production activities are on schedule, ensure the safety of themselves and surrounding workers, and minimize the loss of people and property.	3.0
1.4.2		Understand the structure and principle operation of electrical equipment, electronic components, and basic electrical circuits in automation systems.	2.0
1.4.3		Understand the structure and operating principle of measuring devices; Basic measurement methods applied in checking, monitoring, and collecting information about the operation of automation systems.	2.0
1.4.4		Apply the knowledge of programming to design, operate, repair, replace the operation program of automation systems.	3.0
1.4.5		Apply control and automation knowledge to calculate and simulate automation systems; test system performance; adjust parameters during system operation.	3.0

Notation of PLO		Content of PLOs	Proficiency level
1.5	***L5***	***Apply intensive knowledge of automation in analyzing, designing, installing, and operating technical systems in the field of Automation.***	***3.0***
1.5.1		Apply knowledge of industrial programming, industrial communication, process control to be able to reason, analyze, design some small automation systems.	3.0
1.5.2		Apply knowledge of electrical equipment, electric drives and control of electric drive systems to design, build, operate, maintain/service and repair electric machine control systems.	3.0
1.5.3		Apply knowledge of industrial robots, and intelligent automation systems in designing, building, operating, maintaining/repairing modern production lines..	3.0
1.6	***L6***	***Apply intensive knowledge and analytical thinking in executing experimenting, testing, analyzing and upgrading technical solutions in the field of Automation.***	***3.0***
1.6.1		Apply advanced PLC programming knowledge, automate the production process to analyze, design, evaluate, upgrade and build automation systems in industry.	3.0
1.6.2		Apply IoT knowledge and computerized monitoring controls to analyze, design and build automation systems in new sectors and areas of social life.	3.0
1.6.3		Apply the knowledge of intelligent control, advanced image processing... to improve existing systems, build modern control systems.	3.0
2		**Skills, personal and professional qualities**	
2.1	***L7***	***Be proficient in professional skills, and being able to fit for job positions.***	***4.0***
2.1.1		Design and manufacture automation systems proficiently	4.0
2.1.2		Install automation systems proficiently	4.0
2.1.3		Correct operation of automation systems	3.0
2.1.4		Maintain/service automation systems	3.0
2.2	***L8***	**Work creatively**	***3.0***
2.2.1		Have ability of logical thinking	3.0
2.2.2		Be proactive and creative	3.0
2.2.3		Be progressive and lifelong learning	3.0

Notation of PLO		Content of PLOs	Proficiency level
2.3	***L9***	Have personal attitude, professional ethics and effective contribution in technical practices.	***3.0***
2.3.1		Have sense of responsibility	3.0
2.3.2		Have sense of discipline and industrial style	3.0
2.3.3		Respect yourself and everyone	3.0
2.3.4		Be honesty and integrity in all activities	3.0
3		**Communication and teamwork skills (Soft skills)**	
3.1	***L10***	**Have proficient teamwork skills.**	***4.0***
3.1.1		Actively and effectively participate in group activities	4.0
3.1.2		Organize, run and develop the team to accomplish set tasks	3.0
3.2	***L11***	**Be proficient in communication skills through writing, presentation, discussion and effective use of modern tools and media.**	***4.0***
3.2.1		Master the standard of written communication	3.0
3.2.2		Use multimedia communication tools proficiently and effectively	3.0
3.2.3		Be proficiency in reporting and presentation skills	4.0
4		**Ideation, design, implementation and operation in the context of business and society (Capacity to apply knowledge in practice)**	
4.1	***L12***	**Form technical ideas and solutions.**	***5.0***
4.1.1		Analyze objectives and technical requirements in the field of Automation	4.0
4.1.2		Propose plans and technical solutions	5.0
4.2	***L13***	**Design automation products, processes and systems.**	***5.0***
4.2.1		Use specialized software for the system overall design	3.0
4.2.2		Sketch the physical model	3.0
4.2.3		Simulate systems	3.0
4.2.4		Evaluate design models and solutions	5.0
4.3	***L14***	**Operate automation systems precisely.**	***3.0***
4.3.1		Outline the operation process plan	3.0
4.3.2		Apply process of software deployment	3.0

Notation of PLO		Content of PLOs	Proficiency level
4.3.3		Perform system operation, inspection, and validation	3.0
4.4	***L15***	**Evaluate system performance and propose alternative technical solutions in the field of Automation.**	***5.0***
4.4.1		Be able to analyze the measurement data and interpret the experimental results with the control of the theory	4.0
4.4.2		Detect experimental errors and correct them	2.0
4.4.3		Be able to evaluate the economic - technical efficiency of the system	5.0
4.4.4		Propose technical alternatives or upgrade the system based on factors combining theory and experiment	5.0
4.4.5		Apply periodic system maintenance procedures	3.0
4.5	***L16***	**Explain the impact of technical solutions in global economic, environmental and social contexts.**	***2.0***
4.5.1		Identify the global economic, environmental and social context.	2.0
4.5.2		Explain the impact of engineering solutions on economy, environment and society	2.0
4.6	***L17***	**Apply one's knowledge, skills and professional attitude to lead in engineering.**	***3.0***
4.6.1		Have capacity of information processing and thinking	3.0
4.6.2		Delegate tasks in accordance with competencies	3.0
4.6.3		Solve problems related to production operation (technical solutions)	3.0
4.7	***L18***	**Start a startup or a business in automation technology on one's own**.	***3.0***
4.7.1		Respect corporate culture	3.0
4.7.2		Define the strategy, objectives, and plans of the business in the field of operation	3.0
4.7.3		Have ability of business thinking based on specialized knowledge	3.0

III. WORKING POSITION AFTER GRADUATION

Career prospects

Students who graduate from Automation and Control Engineering Technology - can meet the following job positions:

- Software engineer/designer for automatic system control; testing, operating, inspecting, and accepting projects on automatic control lines at companies and factories;

- Maintenance staff of machines, equipment, and automation systems of production lines in companies, factories, and enterprises.
- Warranty staff working at companies, manufacturers, or commercial centers...
- Research and teaching in research institutes, in training institutions (colleges and universities), vocational training related to automation solutions;
- Working in production and technical management in foreign joint-venture companies, facilities with modern production lines with high-level automation and control systems;
- Working as an expert at metrology sub-departments, measurement and inspection centers of provinces such as the Department of Science and Technology; Provincial Metrology Sub-Department; the metering, measuring, and testing rooms of the Electricity Company; automatic measurement workshops of factories;
- Engineers, managers, operators at consulting companies, designing production lines, and automation systems; factories have automatic system applications in production.…
- Engineers, technical managers at thermal and hydroelectric power plants, consulting and construction companies; electricity transmission and distribution companies;
- Continue to study and research in-depth majors at the graduate level such as Automation, production management, and administration.
- Sales staff, sales of electrical, electronic, refrigeration and automatic products at stores, supermarkets, trade centers... can also set up their own business companies in the field of automation.

LEARNING TAXONOMY

(Issued according to the process of developing outcomes standards and training program towards CDIO approach)

Proficiency scale (PS)		**Brief description**
0.0 ≤ Level ≤ 1.0	Basic	Remembering: Students memorize/recognize/recall knowledge by such activities as defining, repeating, listing, identifying, verifying, …
1.0 < Level ≤ 2.0	Working	Understanding: students construct their own knowledge from learning materials from such activities as explaining, classifying, illustrating, deducing …
2.0 < Level ≤ 3.0		Applying: Students apply knowledge in creating such products as models, real products, simulated products, reports …
3.0 < Level ≤ 4.0	Extensive	Analyzing: Students analyze documents/knowledge into details/parts and point out their overall relationship by analyzing, categorizing, comparing and synthesizing…
4.0 < Level ≤ 5.0		Evaluating: Students make judgments and predictions about knowledge/information according to established standards, criteria and indicators by commenting,

		criticizing, submitting, etc.
5.0 < Level ≤ 6.0	Expert	Creating: Students create/arrange/organize/design/ generalize/details/parts in a different/new way to create new structures/models/products.

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