

**CAN THO UNIVERSITY
SCHOOL OF ENGINEERING
DEPARTMENT OF AUTOMATION**



**PROGRAM DESCRIPTION
AND TEACHING CURRICULUM FOR
UNDERGRADUATE PROGRAM**

MECHATRONICS ENGINEERING

Can Tho, August 2025

**PROGRAM DESCRIPTION AND TEACHING CURRICULUM FOR
UNDERGRADUATE PROGRAM
BACHELOR OF ENGINEERING IN MECHATRONICS ENGINEERING**

I. PROGRAM DESCRIPTION

Pursuant to Decision No. .../QĐ-ĐHCT dated, 20..., issued by the President of Can Tho University on the promulgation of the undergraduate curriculum, the Bachelor of Engineering in Mechatronics Engineering program is described as follows:

1. General Information about the Academic Program

Program Name (tiếng Việt)	Kỹ thuật Cơ điện tử
Program Name (tiếng Anh)	Mechatronics Engineering
Program Code	7520114
Degree-Awarding Institution	Can Tho University
Degree Awarded	Engineer (Bachelor of Engineering)
Level of Study	Undergraduate
Total Credits Required	161 credits
Mode of Study	Full-time; Continuing Education
Normal Duration of Study	4,5 years
Admission Requirements	Applicants holding a High School Diploma or an equivalent qualification
Grading Scale	4
Graduation Requirements	<ul style="list-style-type: none">- Successfully complete all required courses and earn the prescribed number of credits in the curriculum, with a cumulative grade point average (CGPA) of at least 2.0 on a 4.0 scale;- Successfully complete all compulsory graduation requirements. In addition, the average grade for the National Defense and Security Education courses must be at least 5.0 on a 10-point scale;- Not be subject to criminal prosecution and not be under disciplinary suspension during the final academic year.

Career Opportunities	<ul style="list-style-type: none"> - Research, design, and consulting engineer in the field of mechatronics at state-owned, private, and joint-venture enterprises. - Engineering manager responsible for the operation, maintenance, and implementation of mechatronics projects in industrial enterprises. - Entrepreneur or business manager in the field of mechatronics. - Researcher or lecturer in mechatronics at research institutes, research centres, universities, colleges, and vocational education institutions.
Further Study Opportunities	<ul style="list-style-type: none"> - Engage in lifelong learning and independent research; - Pursue postgraduate studies (Master's and Doctoral degrees) in Vietnam or abroad.
Reference Programs Used in Curriculum Development	<ul style="list-style-type: none"> - Ho Chi Minh City University of Technology and Education (https://hcmute.edu.vn/ArticleId/f649d71b-ac08-4033-9a5f-f4b4641e9b59/nganh-cong-nghe-ky-thuat-co-dien-tu). - RMIT University, Australia (https://www.rmit.edu.au/study-with-us/levels-of-study/undergraduate-study/honours-degrees/bachelor-of-engineering-adv-manufacturing-and-mechatronics-honours-bh068/bh068auscy). - Eastern Mediterranean University, Turkey (https://www.emu.edu.tr/en/programs/mechatronics-engineering-undergraduate-program/897?tab=curriculum) - ABET Criteria for Accrediting Engineering Programs, 2025 – 2026 (https://www.abet.org/accreditation/accreditation-criteria/criteria-for-accrediting-engineering-programs-2025-2026/) - AUN-QA Programme Assessment Standards.
Program Accreditation Information	<ul style="list-style-type: none"> - Can Tho University has been accredited as meeting institutional quality standards for the second accreditation cycle (2023–2028). - The Mechatronics Engineering program has been accredited under the AUN-QA standards for the period 2021–2026.
Last Updated Revision	August 2025

2. Program Educational Objectives

2.1. General Educational Objective

The undergraduate Mechatronics Engineering program prepares graduates to become professional mechatronics engineers with a solid academic foundation and the ability to effectively apply scientific, engineering, and technological knowledge to solve practical engineering problems. Graduates develop creative thinking, proactively enhance their professional competence, pursue lifelong learning, and adapt to continuous advances in science and technology to meet the demands of both domestic and international labor markets. They are capable of conducting research, transferring technology, and applying engineering solutions for the benefit of industry and society. Graduates also demonstrate political awareness, professional ethics, social responsibility, and an understanding of the impacts of engineering solutions on society and the environment, while developing teamwork, leadership, multidisciplinary collaboration, and intercultural competence to contribute to the sustainable development of the Mekong Delta, Vietnam, and the global community.

2.2. Program Educational Objectives (PEOs)

Graduates of the Mechatronics Engineering program will:

- a. Possess strong professional competence and effectively apply scientific, engineering, and technological knowledge in mechatronics engineering to solve practical engineering problems (PEO1);
- b. Demonstrate creative thinking and lifelong learning, proactively updating knowledge and adapting to advances in science, technology, and labor market demands (PEO2);
- c. Conduct scientific research, technology transfer, and engineering implementation to address practical problems of industry, society, and the community (PEO3);
- d. Demonstrate professional ethics, responsibility, and awareness of the impacts of engineering solutions on society, the environment, and sustainable development (PEO4);
- e. Work effectively in multidisciplinary teams, demonstrate leadership and collaboration in implementing mechatronics engineering projects, and contribute to scientific, technological, economic, and social development domestically and internationally (PEO5).

3. Program Learning Outcomes (PLOs)

Upon successful completion of the undergraduate Mechatronics Engineering program, graduates will be able to:

3.1. Knowledge

3.1.1. General Education Knowledge

- a. Apply fundamental knowledge of political science, natural sciences, social sciences, and law to solve practical engineering problems (PLO1);
- b. Apply knowledge of physical education, national defense, and security in professional practice (PLO2);

3.1.2. Disciplinary Foundation Knowledge

- a. Apply engineering fundamentals to solve basic engineering problems in mechatronics (PLO3);

3.1.3. Specialized Knowledge

- a. Apply specialized and interdisciplinary knowledge to solve conventional and complex mechatronics engineering problems (PLO4);
- b. Propose feasible mechatronics engineering solutions based on sound engineering principles (PLO5);
- c. Apply fundamental research methods through capstone projects, graduation theses, or research projects (PLO6);

3.2. Skills

3.2.1. Technical Skills

- a. Competently use standard engineering tools and software for simulation, evaluation, control programming, and mechatronic system design (PLO7);
- b. Communicate effectively in engineering environments through written, oral, and digital means (PLO8);
- c. Evaluate the impacts of engineering solutions on society and the environment (PLO9);

3.2.2. Soft Skills

- a. Demonstrate foreign-language proficiency equivalent to Level 3/6 of the Vietnamese Foreign Language Competency Framework and effectively apply information technology and digital competencies (PLO10);
- b. Work effectively in professional teams (PLO11);

3.3. Autonomy and Responsibilities

- a. Proactively undertake multidisciplinary professional responsibilities and contribute to sustainable development (PLO12);
- b. Demonstrate professional ethics, integrity, and compliance with engineering standards (PLO13);
- c. Pursue lifelong learning and continuously improve professional competence in response to technological advances and labor-market changes (PLO14).

4. Admission Criteria

Admissions shall comply with the regulations of the Ministry of Education and Training and the annual admission policy of Can Tho University.

5. Matrix of Relationships among Program Educational Objectives, Program Learning Outcomes, and Courses

5.1. Matrix of Relationships between Program Educational Objectives and Program Learning Outcomes

Program Educational Objectives (1)	Program Learning Outcomes (3)													
	Knowledge (3.1)						Skills (3.2)					Autonomy and Responsibility (3.3)		
	General Education Knowledge (3.1.1)		Disciplinary Foundation Knowledge (3.1.2)	Specialized Knowledge (3.1.3)			Technical Skills (3.2.1)		Soft Skills (3.2.2)					
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12	PLO13	PLO14
PEO1	X	X	X	X	X		X							
PEO2					X									X
PEO3						X			X	X				
PEO4									X			X	X	
PEO5								X			X	X		

5.2. Matrix of Relationships between Courses and Program Learning Outcomes

Course			Program Learning Outcomes (3)													
			Knowledge (3.1)						Skills (3.2)					Autonomy and Responsibility (3.3)		
			General Education Knowledge (3.1.1)	Disciplinary Foundation Knowledge (3.1.2)	Specialized Knowledge (3.1.3)			Technical Skills (3.2.1)			Soft Skills (3.2.2)					
PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12	PLO13	PLO14			
General Education Knowledge																
1	QP010E	National Defense and Security Education 1 (*)		I									R			
2	QP011E	National Defense and Security Education 2 (*)														
3	QP012	National Defense and Security Education 3 (*)	I									R				
4	QP013	National Defense and Security Education 4 (*)		I									R			
5	TC100	Physical Education 1+2+3 (*)		I									R			
6	XH023	Basic English 1 (*)		I									R			
7	XH024	Basic English 2 (*)	R								R			R		
8	XH025	Basic English 3 (*)	R								R			R		
9	XH031	Intensive English 1 (*)	R								R			R		
10	XH032	Intensive English 2 (*)	R								R			R		
11	XH033	Intensive English 3 (*)	R								R			R		
12	FL001	Basic French 1 (*)	R								R			R		
13	FL002	Basic French 2 (*)	R								R			R		
14	FL003	Basic French 3 (*)	R								R			R		
15	FL007	Intensive French 1 (*)	R								R			R		
16	FL008	Intensive French 2 (*)	R								R			R		
17	FL009	Intensive French 3 (*)	R								R			R		

Course			Program Learning Outcomes (3)													
			Knowledge (3.1)						Skills (3.2)					Autonomy and Responsibility (3.3)		
			General Education Knowledge (3.1.1)	Disciplin ary Foundati on Knowled ge (3.1.2)	Specialized Knowledge (3.1.3)			Technical Skills (3.2.1)			Soft Skills (3.2.2)					
PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12	PLO13	PLO14			
18	CT003	Applied Digital Competency (*)	R								R		R		R	
19	CT004	Applied Digital Competency Practicum (*)	R								R		R		R	
20	ML014	Marxist–Leninist Philosophy	I										R			
21	ML016	Marxist–Leninist Political Economy	I										R			
22	ML018	Scientific Socialism	I										R			
23	ML019	History of the Communist Party of Vietnam	I										R			
24	ML021	Ho Chi Minh Thought	I										R			
25	KL001E	Introduction to Law	I										R			
26	ML007	Introduction to Logic	R										R			
27	XH028	Introduction to Sociology	R										R			
28	XH011	Foundations of Vietnamese Culture	R										R			
29	XH012	Practical Vietnamese	R										R			
30	XH014	Introduction to Documentation and Records Management	R										R			
31	KN001E	Soft Skills	R								R	R	R			
32	CN201	Industrial Project Management		I							I		I		I	
33	KN002E	Innovation and Entrepreneurship	R								R		R			
34	TN099	Calculus	R												R	
35	TN012	Linear Algebra and Geometry	R						I				I			
36	TN048	General Physics	R										R		R	
Disciplinary Foundation Knowledge																
37	CN100	Introduction to Engineering								R			R		I	
38	KC491	Fundamental Mathematics for Control Engineering			I				R							
39	CN136	Engineering Mechanics - CK			I											
40	CN137	Strength of Materials - CK			R											
41	CN132E	Engineering Graphics and Technical Drawing - CK			R	I										
42	CN138	Tolerance and Measurement Techniques			I											
43	CN145	Machine Design Fundamentals			R											
44	KC054	Pneumatic Control Systems			R				R					R		
45	CN090	Electronic Circuits			I				I				I			
46	KC050	Digital Electric Circuits			R				I				I			
47	CN056	Electric and Digital Circuit Laboratory			M				R				R			
48	KC049E	Fundamentals of Engineering Programming			M				R	R		R				
49	CN147E	Engineering Materials and Heat Treatment			R											
50	CN050	Machining Practice							R				R			

Course			Program Learning Outcomes (3)													
			Knowledge (3.1)						Skills (3.2)					Autonomy and Responsibility (3.3)		
			General Education Knowledge (3.1.1)	Disciplin ary Foundati on Knowled ge (3.1.2)	Specialized Knowledge (3.1.3)			Technical Skills (3.2.1)			Soft Skills (3.2.2)					
PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12	PLO13	PLO14			
51	CN563E	Design and Analysis of Experiments			I				R			M	M			
52	CN408	Production Management			R				R							
53	CN060T	Research Methods in Science and Technology			R			I				R			M	
54	CN159E	Technical English for Mechatronics Engineering			R							M				M
55	XH019	Technical French for Science and Technology			R							M				M
Specialized Knowledge																
56	KC562E	Fundamentals of Power Electronics				R		R	R							R
57	KC040T	Topics in System Modeling and Identification				R			R			R				
58	CT377	Automatic Control Theory				R			I							I
59	CT378	Sensors and Actuators				R	I									
60	CN582E	Mechatronic Actuators						R	R	R			R			
61	CN579	Programmable Logic Controllers (PLC)				R	R	R	R	R						
62	KC365T	SCADA: Analysis and Design				R	M	R	R	R						
63	KC573	Computer-Based Measurement and Control				R			R			R				
64	KC574	Computer-Based Measurement and Control Laboratory							R	R		M	M	R		
65	KC331	Fundamental Electronics Design Project					M	M	M	M	M			M		R
66	CN038T	Robot Dynamics and Control				R		I	I			R				
67	CN040T	Microcontrollers and Embedded Systems				R		R	R							
68	CN416E	Mechatronic Systems Design				R	R			R						
69	CN516	Mechatronic Systems Design Project						M	M	R	R					R
70	CN392	CAD/CAM/CNC				R			R	R						
71	KC387	Industrial Internship in Mechatronics Engineering					R	M	R	M					R	
72	KC329E	Engineering Projects in Community Service (EPICS)					M	M	M		M		M	M		
73	CT398	Fuzzy Control				R			R					R		
74	CT400	Topics in Control Engineering					M	M	R	M	M		R	M		
75	CT384T	Neural Networks and Deep Learning				R			R				R			
76	KC586T	Applied Computer Vision				R			R				R			
77	CN298ET	Industrial Networks and Communications				R			R							R
78	CN044	Industrial Networks and Communications Laboratory						R	R				R			
79	KC552T	Industry 4.0 Technologies				R		M	R	R						
80	CT409E	Embedded Programming				R			R				R		I	
81	KC519	Graduation Thesis				M	M	M	M	M	M	M		M	M	M

Course			Program Learning Outcomes (3)													
			Knowledge (3.1)						Skills (3.2)						Autonomy and Responsibility (3.3)	
			General Education Knowledge (3.1.1)	Disciplinary Foundation Knowledge (3.1.2)	Specialized Knowledge (3.1.3)			Technical Skills (3.2.1)			Soft Skills (3.2.2)					
PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12	PLO13	PLO14			
82	KC399	Graduation Project				M	R	M	M	M	M		M	M	M	
83	CN590ET	Artificial Intelligence and Applications				R	M	M	R			M				
84	KC599T	Global Positioning Technology					R		R							
85	KC393	Product Research and Development					R						R		I	
86	CN210	Quality Control				R			R						R	
87	CN414	Industrial Maintenance Engineering Management				R				R			R		R	
88	CN542	Engineering Economics				R					R		R		I	
89	CT376E	Industrial Electronics				R			R				R			
90	KC378E	Win and Solar Energy Applications				R		R	M		R					
91	KC564T	Power Electronics for Renewable Energy Applications				R		M							R	
92	KC345E	Modern Control Theory					R		R				R			
93	CN596T	Intelligent Control					M		M				M			

Note: I, R, and M indicate the level of contribution of each course to the achievement of the **Program Learning Outcomes (PLOs)**. These levels are defined as follows:

- ❖ **Introduced (I):** Students demonstrate a fundamental understanding of the required knowledge, perform tasks under guidance through repeated practice, and actively acquire new knowledge and information.
- ❖ **Reinforced (R):** Students apply acquired knowledge to solve similar engineering problems, perform technical skills with increasing proficiency, and actively participate in the acquisition and integration of new knowledge.
- ❖ **Mastered (M):** Students creatively apply their knowledge and skills to practical engineering situations, demonstrate proficiency in the procedures and techniques they have learned, comply with professional codes of ethics, internalize ethical values, and assume responsibility for their professional conduct.

II. TEACHING CURRICULUM

Pursuant to Decision No. .../QĐ-ĐHCT dated, issued by the President of Can Tho University regarding the promulgation of the undergraduate curriculum, the Teaching Curriculum for the Bachelor of Engineering in Mechatronics Engineering is described as follows:

1. Curriculum Structure

Total Program Credits	: 161 credits
General Education Knowledge	: 54 credits (Required: 39; Elective: 15)
Disciplinary Foundation Knowledge	: 41 credits (Required: 41; Elective: 0)
Specialized Knowledge	: 66 credits (Required: 42; Elective: 24)

2. Curriculum Framework

No.	Course Code	Course Title	Cr.	Req.	Elect.	Lec. Hrs.	Lab. Hrs.	Prereq.	Coreq.	
General Education Knowledge										
1	QP010E	National Defense and Security Education 1 (*)	2	2		37	8	Organized by Discipline Group		
2	QP011E	National Defense and Security Education 2 (*)	2	2		22	8	Organized by Discipline Group		
3	QP012	National Defense and Security Education 3 (*)	2	2		24	21	Organized by Discipline Group		
4	QP013	National Defense and Security Education 4 (*)	2	2		4	56	Organized by Discipline Group		
5	TC100	Physical Education 1+2+3 (*)	1+1+1		3		90			
6	XH023	Basic English 1 (*)	4	AV	10 AV hoặc PV	60				
7	XH024	Basic English 2 (*)	3			45			XH023	
8	XH025	Basic English 3 (*)	3			45			XH024	
9	XH031	Intensive English 1 (*)	4			60			XH025	
10	XH032	Intensive English 2 (*)	3			45			XH031	
11	XH033	Intensive English 3 (*)	3			45			XH032	
12	FL001	Basic French 1 (*)	4	PV		10 AV hoặc PV	60			
13	FL002	Basic French 2 (*)	3				45			FL001
14	FL003	Basic French 3 (*)	3				45			FL002
15	FL007	Intensive French 1 (*)	4				60			FL003
16	FL008	Intensive French 2 (*)	3				45			FL007
17	FL009	Intensive French 3 (*)	3				45			FL008
18	CT003	Applied Digital Competency (*)	1	1			15			
19	CT004	Applied Digital Competency Practicum (*)	2	2				60		CT003
20	ML014	Marxist-Leninist Philosophy	3	3			45			
21	ML016	Marxist-Leninist Political Economy	2	2			30		ML014	
22	ML018	Scientific Socialism	2	2			30		ML016	
23	ML019	History of the Communist Party of Vietnam	2	2			30		ML018	
24	ML021	Ho Chi Minh Thought	2	2		30		ML019		
25	KL001E	Introduction to Law	2	2		30				

No.	Course Code	Course Title	Cr.	Req.	Elect.	Lec. Hrs.	Lab. Hrs.	Prereq.	Coreq.
26	ML007	Introduction to Logic	2		2	30			
27	XH028	Introduction to Sociology	2			30			
28	XH011	Foundations of Vietnamese Culture	2			30			
29	XH012	Practical Vietnamese	2			30			
30	XH014	Introduction to Documentation and Records Management	2			30			
31	KN001E	Soft Skills	2			20	20		
32	CN201	Industrial Project Management	2	2		20	20		
33	KN002E	Innovation and Entrepreneurship	2	2		20	20		
34	TN099	Calculus	4	4		60			
35	TN012	Linear Algebra and Geometry	4	4		60			
36	TN048	General Physics	3	3		45			
Sum: 54 Cr. (Req.: 39 Cr.; Elect.: 15 Cr.)									
Disciplinary Foundation Knowledge									
37	CN100	Introduction to Engineering	2	2		15	30		
38	KC491	Fundamental Mathematics for Control Engineering	2	2		30			
39	CN136	Engineering Mechanics - CK	3	3		45			
40	CN137	Strength of Materials - CK	3	3		45		CN136	
41	CN132E	Engineering Graphics and Technical Drawing - CK	3	3		45			
42	CN138	Tolerance and Measurement Techniques	2	2		20	20	CN132E	
43	CN145	Machine Design Fundamentals	3	3		30	30	CN137	CN138
44	KC054	Pneumatic Control Systems	2	2		20	20		
45	CN090	Electronic Circuits	3	3		45			
46	KC050	Digital Electric Circuits	2	2		30		CN090	
47	CN056	Electric and Digital Circuit Laboratory	2	2			60	CN090, KC050	
48	KC049E	Fundamentals of Engineering Programming	3	3		30	30		
49	CN147E	Engineering Materials and Heat Treatment	2	2		30			
50	CN050	Machining Practice	2	2			60		
51	CN563E	Design and Analysis of Experiments	3	3		30	30		
52	CN408	Production Management	2	2		20	20		
53	CN060T	Research Methods in Science and Technology	2	2		20	20		
54	CN159E	Technical English for Mechatronics Engineering	2		2	30			
55	XH019	Technical French for Science and Technology	2			30			
Sum: 43 Cr. (Req.: 43 Cr.; Elect.: 0 Cr.)									
Specialized Knowledge									

No.	Course Code	Course Title	Cr.	Req.	Elect.	Lec. Hrs.	Lab. Hrs.	Prereq.	Coreq.
56	KC562E	Fundamentals of Power Electronics	3	3		30	30	KC050	
57	KC040T	Topics in System Modeling and Identification	3	3		30	30		
58	CT377	Automatic Control Theory	3	3		40	10	KC491	
59	CT378	Sensors and Actuators	2	2		20	20		
60	CN582E	Mechatronic Actuators	3	3		30	30		
61	CN579	Programmable Logic Controllers (PLC)	3	3		30	30	KC050	
62	KC365T	SCADA: Analysis and Design	3	3		30	30		
63	KC573	Computer-Based Measurement and Control	2	2		30		CT378	
64	KC574	Computer-Based Measurement and Control Laboratory	1	1			30		
65	KC331	Fundamental Electronics Design Project	2	2			60		
66	CN038T	Robot Dynamics and Control	3	3		30	30		
67	CN040T	Microcontrollers and Embedded Systems	3	3		30	30		
68	CN416E	Mechatronic Systems Design	2	2		30		CN132E	
69	CN516	Mechatronic Systems Design Project	2	2			60	CN416E	
70	CN392	CAD/CAM/CNC	3	3			90		
71	KC387	Industrial Internship in Mechatronics Engineering	2	2			60		
72	KC329E	Engineering Projects in Community Service (EPICS)	2	2		15	30		
73	CT398	Fuzzy Control	2		7	20	20	CT377	
74	CT400	Topics in Control Engineering	2				60	CT377	
75	CT384T	Neural Networks and Deep Learning	3			30	30	CT377	
76	KC586T	Applied Computer Vision	3			30	30		
77	CN298ET	Industrial Networks and Communications	2			30		CN579	
78	CN044	Industrial Networks and Communications Laboratory	1				30	CN298ET	
79	KC552T	Industry 4.0 Technologies	3			30	30		
80	CT409E	Embedded Programming	3		15	30	30		
81	KC519	Graduation Thesis	15				450	≥ 125 TC	
82	KC399	Graduation Project	6				180	≥ 125 TC	
83	CN590ET	Artificial Intelligence and Applications	2			30			
84	KC599T	Global Positioning Technology	2			30			
85	KC393	Product Research and Development	3			30	30		
86	CN210	Quality Control	2			20	20		
87	CN414	Industrial Maintenance Engineering Management	2			20	20		

No.	Course Code	Course Title	Cr.	Req.	Elect.	Lec. Hrs.	Lab. Hrs.	Prereq.	Coreq.
88	CN542	Engineering Economics	3			45			
89	CT376E	Industrial Electronics	3			30	30		
90	KC378E	Win and Solar Energy Applications	3			30	30		
91	KC564T	Power Electronics for Renewable Energy Applications	2			30			
92	KC345E	Modern Control Theory	2			20	20	CT377	
93	CN596T	Intelligent Control	3			30	30		
Sum: 64 Cr. (Req.: 42 Cr.; Elect.: 22 Cr.)									
Total: 161 Cr. (Req.: 124 Cr.; Elect.: 37 Cr.)									

(*): Non-credit-bearing compulsory course. The course is excluded from the calculation of the cumulative grade point average (CGPA). Students may fulfill this requirement by submitting a qualifying certificate in accordance with Can Tho University regulations or by successfully completing the course..

(**): Course recognized for credit transfer to the Master of Engineering in Control Engineering and Automation program. (See the attached Appendix.).

3. Teaching Plan

No.	Course Code	Course Title	Cr.	Req.	Elect.	Lec. Hrs.	Lab. Hrs.	Prereq.	Coreq.	Note
Semester 1										
1	QP010E	National Defense and Security Education 1 (*)	2	2		37	8			
2	QP011E	National Defense and Security Education 2 (*)	2	2		22	8			
3	QP012	National Defense and Security Education 3 (*)	2	2		14	16			
4	QP013	National Defense and Security Education 4 (*)	2	2		4	56			
5	TN048	General Physics	3	3		45				
6	KL001E	Introduction to Law	2	2		30				
		Sum	13	13	0					
Semester 2										
1	ML014	Marxist–Leninist Philosophy	3	3		45				
2	CN100	Introduction to Engineering	2	2		15	30			
3	CN563E	Design and Analysis of Experiments	3	3		30	30			
4	CT003	Applied Digital Competency (*)	1	1		15				
5	CT004	Applied Digital Competency Practicum (*)	2	2			60		CT003	
6	TN099	Calculus	4	4		60				

No.	Course Code	Course Title	Cr.	Req.	Elect.	Lec. Hrs.	Lab. Hrs.	Prereq.	Coreq.	Note
7	TC100	Physical Education 1 (*)	1		1		30			Student Elective
8	XH023	Basic English 1 (*)	4		4	60				Student Elective (May be fulfilled through an approved certificate)
9	FL001	Basic French 1 (*)	4			60				
10	XH031	Intensive English 1 (*)	4			60				
11	FL007	Intensive French 1 (*)	4			60				
		Sum	20	15	5					

Semester 3

1	KC049E	Fundamentals of Engineering Programming	3	3		30	30			
2	CN136	Engineering Mechanic – CK	3	3		45				
3	TN012	Linear Algebra and Geometry	4	4		60				
4	TC100	Physical Education 2 (*)	1		1		30			Student Elective
5	ML016	Marxist–Leninist Political Economy	2	2		30		ML014		
6	XH024	Basic English 2 (*)	3		3	45		XH023		Student Elective (May be fulfilled through an approved certificate)
7	FL002	Basic French 2 (*)	3			45		FL001		
8	FL032	Intensive English 2 (*)	3			45		XH031		
9	FL008	Intensive French 2 (*)	3			45		FL007		
10	ML007	Introduction to Logic	2		2	30				Student Elective
11	XH028	Introduction to Sociology	2			30				
12	XH011	Foundations of Vietnamese Culture	2			30				
13	XH012	Practical Vietnamese	2			30				
14	XH014	Introduction to Documentation and Records Management	2			20	20			
15	KN001E	Soft Skills	2			20	20			
		Sum	18	12	6					

Semester 4

1	CN201	Industrial Project Management	2	2		20	20			
2	CN408	Production Management	2	2		20	20			
3	KC491	Fundamental Mathematics for Control Engineering (38)	2	2		30				
4	XH025	Basic English 3 (*)	3		3	45		XH024		Student Elective (May be fulfilled through an approved certificate)
5	FL003	Basic French 3 (*)	3			45		FL002		
6	XH033	Intensive English 3 (*)	3			45		XH032		
7	FL009	Intensive French 3 (*)	3			45		FL008		

No.	Course Code	Course Title	Cr.	Req.	Elect.	Lec. Hrs.	Lab. Hrs.	Prereq.	Coreq.	Note
8	TC100	Physical Education 3 (*)	1		1		30			Student Elective
9	ML018	Scientific Socialism	2	2		30		ML016		
		Sum	12	8	4					
Semester 5										
1	KN002E	Innovation and Entrepreneurship	2	2		20	20			
2	CN137	Strength of Materials – CK	3	3		45		CN136		
3	CN138	Tolerance and Measurement Techniques	2	2		20	20			
4	CN090	Electronic Circuits	3	3		45				
5	ML019	History of the Communist Party of Vietnam	2	2		30		ML018		
		Sum	12	12	0					
Semester 6										
1	CN145	Machine Design Fundamentals	3	3		30	30	CN137	CN138	
2	KC050	Digital Electric Circuits	2	2		30		CN090		
3	CN147E	Engineering Materials and Heat Treatment	2	2		30				
4	CT377	Automatic Control Theory	3	3		40	10	KC491		
5	ML021	Ho Chi Minh Thought	2	2		30				
		Sum	12	12	0					
Semester 7										
1	KC054	Pneumatic Control Systems	2	2		20	20			
2	CN056	Electric and Digital Circuit Laboratory	2	2			60	CN090, KC050		
3	CN060T	Research Methods in Science and Technology	2	2		20	20			
4	KC562E	Fundamentals of Power Electronics	3	3		30	30	KC050		
5	CN579	Programmable Logic Controllers (PLC)	3	3		30	30	KC050		
6	CN159E	Technical English for Mechatronics Engineering	2	2		30				
7	XH019	Technical French for Science and Technology	2			30				
		Sum	14	14	0					
Semester 8										
1	CN132E	Engineering Graphics and Technical Drawing – CK	3	3		45				
2	CN050	Machining Practice	2	2			60			
3	KC040T	Topics in System Modeling and Identification	3	3		30	30			
4	CT378	Sensors and Actuators	2	2		20	20			

No.	Course Code	Course Title	Cr.	Req.	Elect.	Lec. Hrs.	Lab. Hrs.	Prereq.	Coreq.	Note
5	CN040T	Microcontrollers and Embedded Systems	3	3		30	30			
		Sum	13	13	0					
Semester 9										
1	CN582E	Mechatronic Actuators	3	3		30	30			
2	KC365T	SCADA: Analysis and Design	3	3		30	30			
3	KC573	Computer-Based Measurement and Control	2	2		30		CT378		
4	KC331	Fundamental Electronics Design Project	2	2			60			
5	CN416E	Mechatronic Systems Design	2	2		30		CN132E		
		Sum	12	12	0					
Semester 10										
1	KC574	Computer-Based Measurement and Control Laboratory	1	1			30			
2	CN038T	Robot Dynamics and Control	3	3		30	30			
3	CN516	Mechatronic Systems Design Project	2	2			60	CN416E		
4	CN392	CAD/CAM/CNC	3	3		90				
5	CT384T	Neural Networks and Deep Learning	3		3	30	30	CT377		Student Elective
6	KC586T	Applied Computer Vision	3			30	30			
7	CN298ET	Industrial Networks and Communications	2			20	20	CN579		
		Sum	12	9	3					
Semester 11										
1	KC329E	Engineering Projects in Community Service (EPICS)	2	2		15	30			
2	CT400	Topics in Control Engineering	2		4		60			
3	CT398	Fuzzy Control	2			20	20			
4	CN044	Industrial Networks and Communications Laboratory	1				30	CN298ET		Student Elective
5	KC552T	Industry 4.0 Technologies	3			30	30			
6	CT409E	Embedded Programming	3			30	30			
		Sum	6	2	4					
Semester 12										

No.	Course Code	Course Title	Cr.	Req.	Elect.	Lec. Hrs.	Lab. Hrs.	Prereq.	Coreq.	Note
1	KC387	Industrial Internship in Mechatronics Engineering	2	2			60			
		Sum	2	2						
Semester 13										
1	KC519	Graduation Thesis	15		15		450	≥ 125 TC		Student Choice: Graduation Thesis, Graduation Project, or Substitute Course
2	KC399	Graduation Project	6		15		180	≥ 125 TC		
3	CN590ET	Artificial Intelligence and Applications	2			30				
4	KC599T	Global Positioning Technology	2			30				
5	KC393	Product Research and Development	3			30	30			
6	CN210	Quality Control	2			20	20			
7	CN414	Industrial Maintenance Engineering Management	2			30	30			
8	CN542	Engineering Economics	3			20	20			
9	CT376E	Industrial Electronics	3			30	30			
10	KC378E	Win and Solar Energy Applications	3			30	30			
11	KC564T	Power Electronics for Renewable Energy Applications	2			30				
12	KC345E	Modern Control Theory	2			20	20	CT377		
13	CN596T	Intelligent Control	3			30	30			
		Sum	15	0	15					
		Total	161	122	39					

4. Course Descriptions

No.	Course Code	Course Title	Cr.	Course Description	Offering Department
1	QP010E	National Defense and Security Education 1 (*)	2	This course introduces the fundamental theoretical principles of the Party's military policy, including the basic concepts of Marxist-Leninist theory and Ho Chi Minh Thought on war, the military, and national defense; the Party's viewpoints on the people's war, the development of the armed forces, the all-people national defense, and the people's security; as well as the Party's policies on integrating socio-economic development with the strengthening of national defense and security. The course also allocates time to introduce selected fundamental aspects of the history of Vietnamese military art throughout different	Center for National Defense and Security Education

				historical periods. In addition, it covers issues related to the development and protection of national border sovereignty, maritime and island sovereignty, national security, and the maintenance of social order and public safety.	
2	QP011E	National Defense and Security Education 2 (*)	2	<p>This course covers selected fundamental aspects of the Party's and the State's national defense and security policies in the current context. The topics include the development of the militia and self-defense forces, the reserve mobilization force, and the strengthening of the material and technical potential for national defense. The course also examines measures to counter the strategy of "peaceful evolution" and subversive activities conducted by hostile forces against the Vietnamese revolution.</p> <p>In addition, the course addresses selected issues relating to ethnicity and religion, as well as efforts to prevent and combat the exploitation of ethnic and religious issues by hostile forces to undermine the Vietnamese revolution. It also covers crime prevention and the maintenance of public order and social security, the prevention and control of cybercrime and other violations of law in cyberspace, and responses to non-traditional security threats in Vietnam.</p>	Center for National Defense and Security Education
3	QP012	National Defense and Security Education 3 (*)	2	<p>This course integrates theoretical instruction with practical training to provide students with fundamental knowledge of military regulations, standardized military routines, and military discipline. Students develop basic military drill skills and other essential military competencies, while acquiring a fundamental understanding of military maps and terrain, as well as protective measures against enemy fire attacks employing high-technology weapons. The course also enhances physical fitness through military training and equips students with the knowledge and practical skills necessary for fire prevention and firefighting, search and rescue, and emergency response.</p>	Center for National Defense and Security Education
4	QP013	National Defense and Security Education 4 (*)	2	<p>This course integrates theoretical instruction with practical training to provide students with fundamental knowledge of military regulations, standardized military routines, and military discipline. Students develop basic military drill skills and other essential military competencies, while acquiring a fundamental understanding of military maps and terrain, as well as protective measures against enemy fire attacks employing high-technology weapons. The course also enhances physical fitness through military training and equips students with the knowledge and practical skills necessary for fire prevention and firefighting, search and rescue, and emergency response.</p>	Center for National Defense and Security Education

5	TC100	Physical Education 1+2+3 (*)	3	<p>Physical Education 1+2+3 is a general course designation representing the Physical Education courses that students other than those majoring in Physical Education are required to complete in order to fulfill the graduation requirements of their academic program.</p> <p>To satisfy the Physical Education requirement, students do not register for course TC100. Instead, they are required to enroll in a specific sequence of Physical Education courses according to their interests and abilities. For example, students choosing the Taekwondo track must register for the following three courses: Taekwondo 1 (TC003); Taekwondo 2 (TC004); Taekwondo 3 (TC019). The same registration requirement applies to all other Physical Education course sequences.</p>	Department of Physical Education
6	XH023	Basic English 1 (*)	4	<p>The Basic English 1 course provides students with essential English vocabulary for basic communication, focusing on topics such as personal information, family, home and living, everyday objects, sports, leisure activities, and basic shopping. In addition to developing students' ability to communicate effectively in basic everyday situations related to these topics, the course also aims to develop English language proficiency equivalent to Level 3 of the Vietnamese Six-Level Foreign Language Proficiency Framework (VSTEP).</p>	School of Foreign Languages
7	XH024	Basic English 2 (*)	3	<p>The Basic English 2 course equips students with essential English vocabulary and communication skills for everyday situations. The course focuses on topics including the countryside and cities, food and cuisine, event planning, fashion, and money. In addition to enhancing students' communicative competence in these contexts, the course aims to develop English language proficiency equivalent to Level 3 of the Vietnamese Six-Level Foreign Language Proficiency Framework (VSTEP).</p>	School of Foreign Languages
8	XH025	Basic English 3 (*)	3	<p>The Basic English 3 course provides students with essential English vocabulary for basic communication, focusing on topics such as film genres, science and technology, travel, and the natural environment. In addition to developing students' ability to communicate effectively in everyday situations related to these topics, the course also aims to develop English language proficiency equivalent to Level 3 of the Vietnamese Six-Level Foreign Language Proficiency Framework (VSTEP).</p>	School of Foreign Languages
9	XH031	Intensive English 1 (*)	4	<p>The Intensive English 1 course (as part of the Intensive English 1–3 sequence) provides students with English language knowledge and</p>	School of Foreign Languages

				<p>opportunities to develop the skills required for effective international communication in common situations. The course is designed based on the following principles and characteristics: (1) Competency-based learning; (2) Integrated and blended learning; (3) Promoting learner independence; (4) Learning through interaction and practice; (5) Purposeful learning; and (6) Flexibility.</p> <p>In addition to enhancing students' English communication skills and overall language proficiency, the course aims to support students in achieving English language proficiency equivalent to Level 4 of the Vietnamese Six-Level Foreign Language Proficiency Framework (VSTEP).</p>	
10	XH032	Intensive English 2 (*)	3	<p>The Intensive English 2 course (as part of the Intensive English 1–3 sequence) provides students with English language knowledge and opportunities to develop the skills required for effective international communication in common situations. The course is designed based on the following principles and characteristics: (1) Competency-based learning; (2) Integrated and blended learning; (3) Promoting learner independence; (4) Learning through interaction and practice; (5) Purposeful learning; and (6) Flexibility.</p> <p>In addition to enhancing students' English communication skills and overall language proficiency, the course aims to support students in achieving English language proficiency equivalent to Level 4 of the Vietnamese Six-Level Foreign Language Proficiency Framework (VSTEP).</p>	School of Foreign Languages
11	XH033	Intensive English 3 (*)	3	<p>The Intensive English 3 course (as part of the Intensive English 1–3 sequence) provides students with English language knowledge and opportunities to develop the skills required for effective international communication in common situations. The course is designed based on the following principles and characteristics: (1) Competency-based learning; (2) Integrated and blended learning; (3) Promoting learner independence; (4) Learning through interaction and practice; (5) Purposeful learning; and (6) Flexibility.</p> <p>In addition to enhancing students' English communication skills and overall language proficiency, the course aims to prepare students to achieve B1 (Level 3) of the Vietnamese Six-Level Foreign Language Proficiency Framework, as assessed through the VSTEP examination.</p>	School of Foreign Languages

12	FL001	Basic French 1 (*)	4	<p>The Basic French 1 course aims to develop students' ability to communicate in everyday situations, including introducing themselves and their families, introducing another person, talking about daily routines and hobbies, shopping, and asking for or giving directions. In addition, the course integrates fundamental aspects of the French language and French culture into its content.</p> <p>Through this course, students become familiar with French pronunciation, intonation, and the alphabet. They learn to conjugate Group I, Group II, and selected Group III verbs in the present tense, and to construct simple sentences in French.</p> <p>The course is organized into three main parts: Introducing oneself and another person, and talking about hobbies and interests; Describing people and developing basic shopping-related communication skills; and Asking for and giving directions, and offering advice.</p> <p>The course is designed to help students achieve foreign language proficiency equivalent to Level 1 of the Vietnamese Six-Level Foreign Language Proficiency Framework (VSTEP).</p>	School of Foreign Languages
13	FL002	Basic French 2 (*)	3	<p>The Basic French 2 course aims to develop students' ability to communicate in everyday situations, including requesting information, asking about the time, explaining issues, accepting or declining invitations, describing daily routines, and talking about future plans.</p> <p>Students also learn how to formulate questions using French object pronouns, conjugate Group I, Group II, and selected Group III verbs in the imperative mood, and give directions and describe locations. Fundamental aspects of the French language and French culture are also incorporated throughout the course.</p> <p>The course is organized into three main parts: Asking about time, describing daily routines, and discussing favorite sports; Describing past events; and Accepting and declining invitations.</p> <p>The course is designed to help students achieve foreign language proficiency equivalent to Level 2 of the Vietnamese Six-Level Foreign Language Proficiency Framework (VSTEP).</p>	School of Foreign Languages
14	FL003	Basic French 3 (*)	3	<p>The Basic French 3 course aims to develop students' ability to communicate in everyday situations, including discussing holidays and festivals, food and cuisine, describing people, objects, and clothing, expressing choices and quantities, introducing family members, and recounting past events.</p>	School of Foreign Languages

				<p>The course also covers essential grammatical topics, including personal pronouns, the past tense, the simple future tense, the imperative with pronouns, and negative sentence structures in French. In addition, elements of French culture, such as French customs, habits, and interests, are integrated into the course content.</p> <p>The course is organized into three main parts: Talking about interests and giving advice; Describing past events; and Discussing future events.</p> <p>The course is designed to help students achieve foreign language proficiency equivalent to Level 3 of the Vietnamese Six-Level Foreign Language Proficiency Framework (VSTEP).</p>	
15	FL007	Intensive French 1 (*)	4	<p>The Intensive French 1 course aims to develop students' communicative competence in everyday situations related to topics such as describing people, housing, leisure activities, and occupations in France and other French-speaking countries within the Francophone community. The course also integrates fundamental aspects of the French language and French culture throughout its content.</p> <p>Through this course, students acquire knowledge of the recent past tense (passé récent), relative pronouns, possessive pronouns, adjective agreement, comparative structures, and the pronunciation of the French sounds [i], [e], and [o].</p> <p>The course is organized into three main parts: Family and society; Youth and fashion; and Daily life and housing.</p> <p>The course is designed to help students achieve foreign language proficiency equivalent to Level 4 of the Vietnamese Six-Level Foreign Language Proficiency Framework (VSTEP).</p>	School of Foreign Languages
16	FL008	Intensive French 2 (*)	3	<p>The Intensive French 2 course aims to develop students' communicative competence in everyday situations related to topics such as health, employment, and leisure activities in France and other French-speaking countries. The course also integrates fundamental aspects of the French language and French culture throughout its content.</p> <p>Through this course, students acquire knowledge of the past tense, future tense, negative sentence structures, and pronunciation features related to the French sounds [r], [l], and [j].</p> <p>The course is organized into three main parts: French cuisine and eating habits; Employment and school memories; and The Internet and festivals in France.</p>	School of Foreign Languages

				The course is designed to help students achieve foreign language proficiency equivalent to Level 4 of the Vietnamese Six-Level Foreign Language Proficiency Framework (VSTEP).	
17	FL009	Intensive French 3 (*)	3	<p>The Intensive French 3 course aims to develop students' communicative competence in everyday situations related to topics such as the media, communication through social media, exploratory travel, and memories of past experiences in France and other French-speaking countries. The course also integrates fundamental aspects of the French language and French culture throughout its content.</p> <p>Through this course, students acquire knowledge of the past tense, future tense, direct and indirect object pronouns, expressions of time, the subjunctive mood, and pronunciation features related to the French sounds [r], [l], and [e].</p> <p>The course is organized into three main parts: Television and newspapers in France; Memories of travel experiences; and The value of happiness and important concerns in life.</p> <p>The course is designed to help students achieve foreign language proficiency equivalent to Level 4 of the Vietnamese Six-Level Foreign Language Proficiency Framework (VSTEP).</p>	School of Foreign Languages
18	CT003	Applied Digital Competency (*)	1	<p>This course equips students with fundamental knowledge and skills in digital competency, including data and information literacy, communication and collaboration in digital environments, digital content creation, and the effective, ethical, and responsible use of generative artificial intelligence (AI). The course also addresses digital safety and well-being while developing students' ability to solve practical problems. These foundational competencies enable students to effectively apply digital technologies throughout their academic studies, support the development of discipline-specific competencies, and facilitate the application of their knowledge and skills in professional practice.</p>	
19	CT004	Applied Digital Competency Practicum (*)	2	<p>This course enables students to apply fundamental digital competency skills in practice, including data and information literacy, communication and collaboration in digital environments, digital content creation, and the effective, ethical, and responsible use of generative artificial intelligence (AI). Students also develop competencies in digital safety and well-being while strengthening their ability to solve practical problems using digital technologies.</p> <p>These foundational practical skills provide the basis for students to effectively apply digital</p>	

				technologies throughout their academic studies, develop discipline-specific competencies, and transfer their knowledge and skills to professional practice.	
20	ML014	Marxist–Leninist Philosophy	3	This course provides students with fundamental and advanced knowledge of Marxist–Leninist Philosophy, including the nature of philosophy and its role in social life; Marxist–Leninist Philosophy and its significance in society; dialectical materialism, including matter and consciousness, materialist dialectics, and the theory of knowledge; and historical materialism, including the theory of socio-economic formations, class and nation, the state and social revolution, social consciousness, and the philosophy of humanity.	Department of Political Science
21	ML016	Marxist–Leninist Political Economy	2	This course provides students with fundamental and advanced knowledge of Marxist–Leninist Political Economy. The course covers the subject matter and functions of Marxist–Leninist Political Economy; commodities, markets, and the roles of economic actors in the market; the theory of surplus value in a market economy; competition and monopoly in a market economy; and the socialist-oriented market economy together with economic interest relations in Vietnam.	Department of Political Science
22	ML018	Scientific Socialism	2	This course provides students with an understanding of the general theoretical foundations of Scientific Socialism and their practical application in Vietnam's current process of socialist development. The course covers the emergence and development of Scientific Socialism; the historical mission of the working class; socialism and the transition to socialism; socialist democracy and the socialist state; alliances among social classes and social strata; issues concerning ethnicity and religion; and family-related issues during the transition to socialism.	Department of Political Science
23	ML019	History of the Communist Party of Vietnam	2	This course provides students with an understanding of the objectives, purposes, tasks, and research methods of the History of the Communist Party of Vietnam, as well as the fundamental, core, and systematic knowledge of the Party's historical development. The course covers the establishment of the Communist Party of Vietnam (1920–1930); the Party's leadership in the struggle for political power (1930–1945); its leadership during the two resistance wars against French colonialism and American imperialism, culminating in national liberation and reunification (1945–1975); and its leadership in guiding the country's transition to socialism and the	Department of Political Science

				<p>implementation of the Đổi Mới (Renovation) process (1975–2018).</p> <p>The course also examines the Party's major achievements and limitations, and draws lessons from its leadership of the Vietnamese revolution. Through these studies, students are expected to strengthen their understanding of and confidence in the Party, while developing the ability to apply the knowledge acquired to professional practice and contribute to the development and protection of the Socialist Republic of Vietnam.</p>	
24	ML021	Ho Chi Minh Thought	2	<p>Together with the course Fundamental Principles of Marxism–Leninism, this course provides students with an understanding of Ho Chi Minh Thought as the ideological foundation and guiding principle of the Communist Party of Vietnam and the Vietnamese revolution. It also further develops students' knowledge of Marxism–Leninism and contributes to the cultivation of ethical values and civic responsibility.</p> <p>In addition to an introductory chapter, the course comprises seven chapters. Chapter 1 examines the foundations, formation, and development of Ho Chi Minh Thought, while Chapters 2–7 present its fundamental principles in accordance with the course learning objectives, providing students with a systematic understanding of Ho Chi Minh's ideology, moral philosophy, and cultural values.</p>	Department of Political Science
25	KL001E	Introduction to Law	2	<p>This course is designed for students outside the Law discipline. It introduces the fundamental principles of the Marxist–Leninist theory of the State and law, covering the origin, nature, forms, functions, and historical evolution of different types of states and legal systems across various socio-economic formations throughout human history.</p> <p>The course also examines the role of the State within the political system, the structure of the State apparatus, and the organization of government institutions. In addition, it provides students with an introduction to the major branches of Vietnamese law, including the fundamental rights and obligations of citizens, criminal law, administrative law, and legal provisions governing marriage, divorce, inheritance, and other common legal matters.</p>	School of Law
26	ML007	Introduction to Logic	2	<p>This course introduces students to the fundamental principles of formal logic. It examines the basic laws of thought, including the Law of Identity, the Law of Non-Contradiction, the Law of Excluded Middle, and the Principle of Sufficient Reason. The</p>	Department of Political Science

				course also explores the fundamental forms of logical thinking, including concepts, judgments, inference, hypotheses, proof, refutation, and logical fallacies.	
27	XH028	Introduction to Sociology	2	This course examines the principles and patterns underlying the formation, development, and transformation of society, as well as the reciprocal relationships and interactions between individuals and society. Sociology focuses on the study of social relationships and social interactions as manifested through human behavior within groups, organizations, and broader social systems.	School of Social Sciences and Humanities
28	XH011	Foundations of Vietnamese Culture	2	This course introduces students to the fundamental concepts of cultural studies and Vietnamese culture. It examines the system of cultural elements, the defining characteristics and developmental patterns of Vietnamese culture, and the cultural regions of Vietnam. The course also presents approaches and research methods for the study of Vietnamese culture, while developing students' ability to apply cultural theories and concepts to the analysis of language and literary texts.	School of Social Sciences and Humanities
29	XH012	Practical Vietnamese	2	Học phần được thiết kế thành 4 chương. Mỗi chương gồm hai phần chính được biên soạn đan xen vào nhau: giản yếu về lý thuyết và hệ thống bài tập thực hành. Chương 1 tập trung vào vấn đề về chữ viết và chính tả. Chương 2 tập trung rèn luyện kỹ năng dùng từ. Tương tự, nội dung Chương 3 là rèn luyện kỹ năng về câu. Chương 4 rèn luyện kỹ năng tạo lập và tiếp nhận văn bản.	School of Social Sciences and Humanities
30	XH014	Introduction to Documentation and Records Management	2	This course provides students with theoretical and practical knowledge of administrative documents and archival science. It enables students to understand the role of administrative documents and archival records in organizational management. The course also develops students' competencies in drafting and systematically managing administrative documents, selecting and classifying records for archival preservation, and retrieving and using archival records effectively to support management activities in educational institutions and other organizations.	School of Social Sciences and Humanities
31	KN001E	Soft Skills	2	This course equips students with fundamental knowledge and practical training in the development of essential soft skills. The course covers communication skills and the fundamental principles of effective communication; active listening, public speaking, and presentation skills; teamwork skills for effective collaboration in academic	Center for Student Counseling, Support and Entrepreneurship

				and professional environments; creative thinking; time management; and emotional management.	
32	CN201	Industrial Project Management	2	This course provides students with fundamental knowledge of the key aspects of project management, including managerial, technical, economic, and financial considerations throughout the project life cycle. The course covers the principles of project development and project management, the stages of project planning and execution, project organization and human resource management, project administration, and essential project management techniques.	School of Engineering
33	KN002E	Innovation and Entrepreneurship	2	This course introduces students to the fundamental concepts of creativity, innovation, and entrepreneurship. It covers idea generation for entrepreneurial ventures, the selection of appropriate forms of business ownership, and the basic principles of intellectual property rights. The course also develops students' knowledge and practical skills in market analysis, including assessing strengths, opportunities, threats, and the risks associated with commercializing innovative products and business ideas, identifying entrepreneurial opportunities, and preparing startup business plans. In addition, students have the opportunity to learn from the experiences of successful entrepreneurs and/or participate in visits to successful startup enterprises.	Center for Student Counseling, Support and Entrepreneurship
34	TN099	Calculus	4	This course provides students with fundamental knowledge of calculus and its applications. The course is organized into six chapters. Chapter 1 introduces functions, limits, and continuity. Chapter 2 covers derivatives and differentials of single-variable functions and their applications. Chapter 3 presents integration of single-variable functions and its applications. Chapter 4 introduces multivariable calculus. Chapter 5 covers double and triple integrals and their applications in geometry and physics. Chapter 6 introduces ordinary differential equations.	School of Natural Sciences
35	TN012	Linear Algebra and Geometry	4	This course provides students with fundamental knowledge of linear algebra and analytic geometry, including systems of linear equations, matrices, determinants, vector spaces, linear transformations, eigenvalues and eigenvectors, quadratic forms, and the canonical equations of conic sections in the plane and quadric surfaces in three-dimensional space. The course establishes the mathematical foundation required for advanced mathematics	School of Natural Sciences

				<p>courses and subsequent specialized engineering courses.</p> <p>In addition to the theoretical content, the course includes a comprehensive collection of exercises ranging from introductory to advanced levels, designed to develop students' analytical thinking and mathematical problem-solving skills.</p>	
36	TN048	General Physics	3	<p>This General Physics course consists of 13 chapters and provides students with a comprehensive introduction to classical mechanics, fluid mechanics, thermodynamics, electricity and magnetism, wave optics, and modern physics. Topics include particle dynamics, Newtonian mechanics, conservation laws, rigid-body dynamics, momentum, angular momentum, mechanical energy, the Huygens–Steiner theorem, fluid mechanics, Bernoulli's principle, Pascal's principle, mechanical oscillations and waves, Huygens' principle, the Doppler effect, kinetic molecular theory, thermodynamics, electric and magnetic fields, wave optics, the properties of electrical and magnetic materials, and nuclear physics.</p> <p>The course enables students to understand and explain a wide range of natural phenomena and the operating principles of fundamental mechanical, thermal, electrical, and optical systems. It also provides the scientific foundation required for subsequent engineering science and specialized engineering courses.</p>	School of Natural Sciences
37	CN100	Introduction to Engineering	2	<p>This course introduces students to the fundamental concepts of engineering and develops essential professional skills, including technical writing, oral presentations, technical report preparation, and engineering problem-solving. The course also promotes an understanding of engineering ethics, professionalism, and the responsibilities of engineers in serving society.</p> <p>In addition, the course introduces the engineering design process, project management, and other fundamental engineering practices. Students gain hands-on experience with engineering tools and software commonly used across engineering disciplines. Through team-based activities, they develop the ability to work effectively in multidisciplinary teams and apply engineering design methodologies to solve real-world engineering problems.</p>	School of Engineering
38	KC491	Fundamental Mathematics for Control Engineering	2	<p>This course provides the mathematical foundation required for students in Control and Automation Engineering and Mechatronics Engineering. It develops the fundamental analytical and computational skills needed for</p>	School of Engineering

				<p>modeling and analyzing engineering systems. Mathematical models of continuous control systems are introduced using ordinary differential equations, vectors, and matrices. The course also covers classical mathematical tools widely used in control engineering, including Fourier series, frequency-domain analysis, signal spectrum analysis, sampling theory, signal discretization, Laplace transforms, and Z-transforms.</p> <p>The mathematical concepts and techniques introduced in this course provide the essential foundation for advanced courses in control engineering, as well as other specialized areas such as digital image processing, artificial neural networks, and convolutional neural networks (CNNs).</p>	
39	CN136	Engineering Mechanics - CK	3	<p>Theoretical Mechanics is a fundamental engineering science course that introduces the basic principles and general laws of mechanics. The course is organized into three major components: Statics, which studies force systems and the conditions required for the equilibrium of bodies and mechanical systems; Kinematics, which describes the geometric characteristics of motion—including displacement, trajectory, velocity, and acceleration—without considering the forces responsible for the motion; and Dynamics, which examines the motion of particles and mechanical systems under the action of forces.</p> <p>The knowledge acquired in this course provides students with the theoretical foundation required to analyze and solve mechanical problems related to engineering mechanisms and machinery, and supports subsequent study in mechanical and mechatronics engineering.</p>	School of Engineering
40	CN137	Strength of Materials - CK	3	<p>Strength of Materials is a fundamental engineering course that provides students with the theoretical principles required to analyze the mechanical behavior of structural members subjected to various loading conditions. The course introduces the concepts of internal forces and external loads, with emphasis on simple structural elements, including axially loaded members in tension and compression, beams subjected to bending, and shafts subjected to torsion.</p> <p>Students learn to determine the stress, strain, deformation, and deflection produced by applied loads, providing the basis for the safe and efficient design of engineering structures and mechanical components. The knowledge and analytical methods developed in this course form an essential foundation for subsequent studies in Mechanical Engineering, Civil</p>	School of Engineering

				Engineering, Transportation Engineering, Water Resources Engineering, and related engineering disciplines.	
41	CN132E	Engineering Graphics and Technical Drawing - CK	3	This course provides students with the fundamental knowledge and skills required to interpret and prepare mechanical engineering drawings, serving as a foundation for subsequent courses in Mechanical Engineering and related engineering disciplines. The course also cultivates professional engineering practices by developing students' ability to work systematically, accurately, and meticulously. Furthermore, it promotes professional ethics and responsibility through adherence to applicable laws, regulations, engineering standards, and professional codes of conduct.	School of Engineering
42	CN138	Tolerance and Measurement Techniques	2	This course consists of two major components: 1. Tolerances and Fits: Students are introduced to the fundamental principles and design methods of dimensional tolerancing, geometric dimensioning and tolerancing (GD&T), mechanical fits, surface roughness, and tolerance stack-up analysis. 2. Engineering Metrology: Students learn the fundamental principles of engineering measurement, including measurement techniques and procedures for determining the dimensional and geometric characteristics of mechanical components and machinery.	School of Engineering
43	CN145	Machine Design Fundamentals	3	This course provides students with the fundamental principles and analytical methods required for the design of machine elements, establishing the foundation for the design of machines and mechanical systems. The course is organized into four major components: (1) Fundamentals of Machine Element Design: Principles of machine element analysis and mechanical design. (2) Mechanical Joints: Design and analysis of riveted joints, threaded fasteners, welded joints, interference (press) fits, and keyed connections. (3) Mechanical Power Transmission: Design and analysis of gear drives, belt drives, chain drives, and worm gear drives. (4) Shafts and Bearings: Design and analysis of shafts, plain bearings, and rolling-element bearings. Upon completion of the course, students will possess the theoretical knowledge required for the analysis and design of machine components and will be well prepared for advanced courses in machine design and related engineering disciplines.	School of Engineering
44	KC054	Pneumatic Control Systems	2	This course equips students with the fundamental principles of pneumatic systems,	School of Engineering

				including system components and operating principles, the installation and assembly of pneumatic equipment, the interpretation of pneumatic circuit diagrams, and the safe operation and maintenance of pneumatic systems in accordance with design specifications and application requirements.	
45	CN090	Electronic Circuits	3	<p>This course introduces students to the fundamentals of electronic devices, electric circuit analysis, and analog electronic circuits. The course is organized into three major components: (1) Semiconductor Devices: Structure, operating principles, characteristics, and parameter calculations of commonly used semiconductor devices, including diodes, BJTs, FETs, MOSFETs, switching devices, and optoelectronic devices. (2) Electric Circuit Analysis: Fundamental concepts, laws, and network theorems, including Kirchhoff's laws, Thevenin's theorem, Norton's theorem, Millman's theorem, and the superposition theorem, together with analytical methods for DC, AC, and transient circuit analysis. (3) Analog Electronic Circuits: Analysis and design of basic analog circuits, including diode circuits, transistor amplifier circuits, operational amplifier circuits, power amplifiers, and oscillator circuits.</p> <p>Upon completion of the course, students will possess the fundamental knowledge and analytical skills required to analyze, design, and troubleshoot electronic circuits of varying complexity.</p>	School of Engineering
46	KC050	Digital Electric Circuits	2	<p>This course is organized into two major components: (1) Digital Electronics: Students are introduced to number systems, Boolean algebra, logic functions, methods for representing and minimizing Boolean expressions, and the fundamental building blocks of digital electronic circuits. The course also covers the analysis and design of combinational and sequential logic circuits. (2) Pulse and Switching Circuits: Students learn the fundamental principles of pulse signals, pulse waveforms, and the transient responses of RC and RL circuits. The course also introduces the analysis and applications of classical pulse-generation circuits, including astable, monostable, and bistable multivibrators, pulse-shaping circuits, and Schmitt trigger circuits.</p> <p>Upon completion of the course, students will possess the fundamental knowledge required to analyze and design digital electronic and pulse-processing circuits, providing a solid foundation for advanced studies in digital</p>	School of Engineering

				systems, microcontrollers, and embedded systems.	
47	CN056	Electric and Digital Circuit Laboratory	2	<p>The Electronic Circuits and Digital Pulse Circuits Laboratory course provides students with hands-on experience in applying the principles of electronic devices, analog electronic circuits, digital electronic circuits, and pulse circuits through laboratory experiments relevant to Control and Automation Engineering and Mechatronics Engineering.</p> <p>Students develop practical skills in circuit assembly, measurement, testing, troubleshooting, and performance evaluation. They also gain proficiency in using industry-standard electronic design automation (EDA) software to simulate, analyze, and design electronic circuits, and to compare simulation results with experimental observations.</p> <p>Through laboratory-based learning, students strengthen their technical competencies, practical problem-solving abilities, teamwork and communication skills, professional responsibility, and commitment to safe laboratory practices.</p>	School of Engineering
48	KC049E	Fundamentals of Engineering Programming	3	<p>This course introduces students to the fundamentals of computer programming, including programming concepts, data types, and basic data structures. It also covers the principles of algorithm design and common methods for representing algorithms. Students learn how to develop algorithms and implement them using a programming language to solve computational problems.</p> <p>The course places particular emphasis on the C programming language, one of the most widely used programming languages in engineering and embedded systems. Students develop a solid understanding of the importance of algorithms and structured programming while acquiring practical programming skills in C. Upon completion of the course, students will be well prepared to apply the C programming language in subsequent courses and research related to Control and Automation Engineering, Mechatronics Engineering, and other engineering disciplines.</p>	School of Engineering
49	CN147E	Engineering Materials and Heat Treatment	3	<p>This course provides students with fundamental knowledge of the structure, properties, and engineering applications of commonly used engineering materials. Students develop the ability to analyze and select appropriate materials for the design and manufacture of machine elements and mechanical components.</p>	School of Engineering

				<p>The course also introduces the principles of heat treatment and enables students to analyze and compare different heat treatment processes in order to achieve the desired mechanical and physical properties of engineering materials. Upon completion of the course, students will be able to make informed material selection decisions and evaluate the effects of heat treatment on material performance in engineering applications.</p>	
50	CN050	Machining Practice	2	<p>This course provides students with fundamental knowledge and practical skills in metal cutting and machining processes using a variety of conventional machine tools. Students receive hands-on training in the safe operation of machine tools, workpiece setup and fixturing, and the selection of appropriate machining methods and process plans for manufacturing machine components to specified design and quality requirements.</p> <p>Upon completion of the course, students will be able to apply appropriate machining techniques, operate machine tools safely, and produce mechanical components that meet engineering specifications.</p>	School of Engineering
51	CN563E	Design and Analysis of Experiments	3	<p>This course introduces the fundamental principles of Design and Analysis of Experiments (DOE). It equips students with the knowledge and practical skills required to formulate research questions and hypotheses, design scientifically sound experiments, collect appropriate data, and analyze and interpret experimental results.</p> <p>Through this course, students develop the ability to apply statistical and experimental design techniques to solve engineering and research problems, providing an essential foundation for scientific research and engineering practice.</p>	School of Engineering
52	CN408	Production Management	2	<p>This course provides students with the fundamental principles and techniques of industrial production management. It equips students with the knowledge and skills required to solve practical production management problems encountered in manufacturing enterprises, industrial plants, and product supply and distribution organizations.</p> <p>Major topics include demand forecasting, production planning and scheduling, facility location planning, aggregate planning, product and service design, inventory management, and production resource planning to ensure efficient, cost-effective, and timely manufacturing operations.</p>	School of Engineering

53	CN060T	Research Methods in Science and Technology	2	<p>This course provides students with the fundamental knowledge, research skills, and professional attitudes required to conduct scientific research in the fields of science and technology. The course introduces the principles of research methodology, including research topic selection, research planning and implementation, literature review and critical analysis of scholarly references, problem identification, formulation of research hypotheses, development of scientific arguments and supporting evidence, methods for validating research findings, and the preparation and presentation of research outputs in the form of scientific papers, technical reports, and theses.</p> <p>Upon completion of the course, students will be able to plan and conduct scientific research systematically, critically evaluate published literature, and communicate research findings effectively using accepted academic and scientific standards.</p>	School of Engineering
54	CN159E	Technical English for Mechatronics Engineering	2	<p>This course is designed to strengthen students' proficiency in technical English by introducing the grammatical structures and language conventions commonly used in engineering communication. Through course materials specifically tailored to Mechatronics Engineering, students develop discipline-specific vocabulary and improve their ability to read and comprehend English-language technical documents.</p> <p>Upon completion of the course, students will be better prepared to access technical literature, scientific publications, and engineering documentation in English, thereby supporting their academic learning, research activities, and future professional practice.</p>	School of Engineering
55	XH019	Technical French for Science and Technology	3	<p>This course develops students' French language proficiency for communication in science and technology. Students learn to communicate effectively in professional and academic contexts, including introducing themselves (personal information, educational background, and occupation), presenting scientific and technological activities, describing engineering and technology projects, and conducting professional correspondence. Particular emphasis is placed on the development of technical vocabulary relevant to engineering and scientific disciplines.</p> <p>The course also incorporates elements of French language and culture, enabling students to develop both linguistic competence and</p>	School of Engineering

				intercultural awareness in professional communication.	
56	KC562E	Fundamentals of Power Electronics	3	<p>This course introduces the fundamental principles of power electronics, including power semiconductor devices, power electronic converters, and the basic concepts of current, voltage, and electrical power. Students study the operating principles, analysis, and applications of rectifiers, inverters, and DC–DC converters.</p> <p>The course emphasizes practical applications of power electronics in electric drive systems, electric vehicles (EVs), renewable energy systems, industrial automation and manufacturing, and residential and industrial electrical equipment. In addition to the theoretical content, students complete a design project that reinforces their understanding while developing skills in engineering analysis, circuit design, problem-solving, and teamwork. The course provides the essential foundation for advanced courses in power electronics, electric drives, renewable energy, and industrial automation.</p>	School of Engineering
57	KC040T	Topics in System Modeling and Identification	3	<p>This course introduces the fundamental theories and techniques of dynamic system modeling and system identification. It covers mathematical modeling methods together with both non-parametric and parametric approaches to system identification.</p> <p>Topics include non-parametric system identification using transient response analysis, correlation analysis, frequency response analysis, Fourier analysis, and spectral analysis. The course also examines parametric model structures and identification techniques, including the linear least-squares (LS) method, prediction error method (PEM), instrumental variable (IV) method, and subspace identification methods.</p> <p>Additional topics include offline and online parameter estimation algorithms, model validation, and the theory and experimental implementation of closed-loop system identification. The course provides students with the theoretical and practical foundation required for modeling, parameter estimation, and identification of dynamic systems encountered in control and automation engineering.</p>	School of Engineering
58	CT377	Automatic Control Theory	3	<p>This course introduces the fundamental principles of automatic control systems, including the mathematical modeling and analysis of dynamic systems. Students learn to develop mathematical models of control</p>	School of Engineering

				<p>systems, analyze system performance, and evaluate the stability of continuous-time linear control systems.</p> <p>The course also covers the design of classical feedback controllers, including lead compensators, lag compensators, and Proportional–Integral–Derivative (PID) controllers, to achieve specified performance requirements. In addition, students gain practical experience using MATLAB and Simulink for system modeling, simulation, performance analysis, and controller design.</p> <p>Upon completion of the course, students will be able to model, analyze, and design classical control systems and apply computer-aided engineering tools to solve practical control engineering problems.</p>	
59	CT378	Sensors and Actuators	2	<p>This course introduces the fundamental principles of sensors and transducers, which are essential components of modern measurement and automatic control systems. Students learn how physical quantities—including electrical, magnetic, acoustic, optical, and radiation phenomena—are converted into electrical signals for acquisition, processing, display, storage, and transmission to control systems.</p> <p>The course covers the static characteristics of sensors, the construction, operating principles, and applications of resistive, inductive, and capacitive sensors, as well as signal conditioning, sensor interface circuits, and other fundamental sensing techniques.</p> <p>The laboratory component provides students with hands-on experience using modern computer-based measurement and instrumentation systems. Through practical experiments, students develop the skills required to measure, acquire, analyze, and interpret sensor data for engineering applications.</p>	School of Engineering
60	CN582E	Mechatronic Actuators	3	<p>This course introduces the fundamental principles of mechatronic actuators, which are essential components of modern mechatronic and automation systems. The course covers the operating principles, characteristics, and applications of major actuator technologies used for high-power energy conversion, including electromechanical actuators, pneumatic actuators, and other industrial actuation systems.</p> <p>In addition, students study the control methods and drive systems associated with these actuators. The course enables students to select, integrate, and control commercially available actuators effectively while developing the</p>	School of Engineering

				knowledge and creativity required to design innovative control strategies that improve the performance and efficiency of both existing and emerging actuation technologies.	
61	CN579	Programmable Logic Controllers (PLC)	3	<p>This course is designed for students in Mechatronics Engineering and Control and Automation Engineering. It introduces the fundamental principles of Programmable Logic Controllers (PLCs), including their architecture, operating principles, programming methods, and industrial applications.</p> <p>Students develop the ability to analyze automation systems, design and implement PLC programs, and integrate sensors, actuators, and other field devices into PLC-based control systems. The course also emphasizes the development of the professional competencies and engineering practices required for working in modern industrial environments.</p> <p>Through laboratory-based learning, students reinforce the theoretical concepts by programming different PLC platforms, analyzing automation systems, developing control algorithms, designing flowcharts, and implementing PLC-based control solutions for industrial manufacturing and automation processes.</p> <p>Upon completion of the course, students will be able to design, program, test, and troubleshoot PLC-controlled automation systems used in manufacturing plants and industrial facilities.</p>	School of Engineering
62	KC365T	SCADA: Analysis and Design	3	<p>This course provides advanced knowledge of Supervisory Control and Data Acquisition (SCADA) systems for students in the graduate programs of Control and Automation Engineering, Mechatronics Engineering, and Electrical Engineering. It focuses on the principles, architecture, design, and implementation of modern SCADA systems used for industrial monitoring, supervisory control, and remote data acquisition.</p> <p>Students learn to design and develop human-machine interfaces (HMIs), configure tag-based communication between programmable controllers and SCADA software using OPC (Open Platform Communications) servers, implement data acquisition and visualization, and develop cloud-based SCADA applications for remote monitoring and supervisory control. Upon completion of the course, students will be able to analyze, design, and implement SCADA systems for modern industrial automation applications.</p>	School of Engineering

63	KC573	Computer-Based Measurement and Control	2	<p>This course introduces the fundamental principles of computer interfacing, data acquisition, and embedded measurement and control systems. Students learn the operation of standard computer communication interfaces, the design of measurement circuits for sensor signal acquisition, and the development of embedded systems for data acquisition, process control, and computer communication.</p> <p>The course also covers computer communication programming using widely adopted industrial communication protocols, including Modbus, PROFIBUS, and Industrial Ethernet. Upon completion of the course, students will be able to design and implement embedded systems that integrate sensors, measurement circuits, controllers, and industrial communication networks for modern automation applications.</p>	School of Engineering
64	KC574	Computer-Based Measurement and Control Laboratory	1	<p>The Computer-Based Measurement and Control Laboratory course provides students with hands-on experience in applying the principles of computer interfacing, data acquisition, and measurement and control systems. Students design, simulate, implement, and evaluate computer-integrated measurement and control systems using modern hardware and software tools.</p> <p>Laboratory activities focus on programming communication between computers and peripheral devices using standard communication interfaces such as UART, RS-485, and Ethernet, together with industrial communication protocols including Modbus and Industrial Ethernet. Through laboratory experiments and team-based design projects, students develop competencies in system analysis, experimental evaluation, and technical report writing. The course also strengthens teamwork, technical communication in English, digital literacy, professional responsibility, and safe laboratory practices, preparing students for engineering practice in industrial automation and embedded systems.</p>	School of Engineering
65	KC331	Fundamental Electronics Design Project	2	<p>The Fundamental Electronics Project is a project-based design course that builds upon students' prior knowledge of electronics, control systems, sensors, actuators, mechanical design, and mechatronic system design. Students work in teams to design, develop, integrate, implement, and evaluate a complete mechatronic system that addresses a practical engineering problem.</p> <p>Throughout the project, students experience the full engineering design process, including</p>	School of Engineering

				multidisciplinary system integration, consideration of the system's operating environment, identification of design constraints, compliance with engineering standards, and the evaluation of alternative design solutions. The course also strengthens students' project management, teamwork, technical communication, and engineering design skills, preparing them for more advanced capstone design projects and professional engineering practice.	
66	CN038T	Robot Dynamics and Control	3	<p>This course is a specialized course that introduces the fundamental principles of robotics. It covers the architecture and configuration of robotic systems, forward and inverse kinematics, robot dynamics, robot control algorithms, trajectory planning, robot localization, and motion control.</p> <p>The course also examines robot–environment interaction and multi-robot interaction and coordination, providing students with the theoretical foundation required for the analysis, modeling, and control of modern robotic systems. Upon completion of the course, students will be able to analyze robotic manipulators, develop motion planning strategies, and implement control algorithms for robotic applications.</p>	School of Engineering
67	CN040T	Microcontrollers and Embedded Systems	3	<p>This course is part of the engineering foundation curriculum and introduces students to the principles of ARM-based embedded systems. Students acquire fundamental knowledge of the ARM processor architecture, embedded hardware and software, and real-time embedded programming.</p> <p>The course also covers the programming and application of key embedded peripherals, including Analog-to-Digital Converters (ADCs), Pulse Width Modulation (PWM) modules, Universal Asynchronous Receiver/Transmitter (UART) communication, and Controller Area Network (CAN) bus communication. Upon completion of the course, students will be able to develop embedded applications for measurement, control, and communication using ARM-based microcontroller platforms.</p>	School of Engineering
68	CN416E	Mechatronic Systems Design	2	Mechatronic System Design is a core course in the Mechatronics Engineering curriculum. It integrates knowledge from engineering foundation courses and specialized subjects to provide students with a comprehensive	School of Engineering

				<p>understanding of the design and integration of mechatronic systems.</p> <p>The course begins with a review of the fundamental principles of mechanical systems, actuators, sensors, control systems, and system modeling and simulation. It then emphasizes the systematic integration of these subsystems into a cohesive mechatronic system through a systems engineering approach.</p> <p>Students are introduced to the complete engineering design process for mechatronic systems, including system architecture, subsystem integration, design trade-offs, prototyping, and performance evaluation. Upon completion of the course, students will be able to apply multidisciplinary engineering principles to design and develop integrated mechatronic systems and will be well prepared for advanced design projects and capstone engineering experiences.</p>	
69	CN516	Mechatronic Systems Design Project	2	<p>Mechatronic System Design Project is a project-based capstone design course that builds upon the knowledge and skills developed in the Mechatronic System Design course. Students work in teams to apply multidisciplinary engineering principles—including mechanical design, electronics, sensors, actuators, and control systems—to the design, development, integration, implementation, and validation of a complete mechatronic system.</p> <p>Throughout the project, students experience the complete engineering design process, including requirements analysis, system architecture development, multidisciplinary subsystem integration, prototype development, system testing and validation, and performance evaluation. The course also emphasizes consideration of the operating environment, design constraints, engineering standards, and alternative design solutions while strengthening students' competencies in project management, teamwork, technical communication, and professional engineering practice.</p>	School of Engineering
70	CN392	CAD/CAM/ CNC	3	<p>CAD/CAM/CNC introduces the fundamental principles of Computer-Aided Design (CAD), Computer-Aided Manufacturing (CAM), and Computer Numerical Control (CNC) technologies. The course covers CNC machining processes using CNC lathes and CNC milling machines, while reinforcing students' understanding of conventional machining operations performed on manual machine tools.</p> <p>Students study geometric modeling, two-dimensional (2D) and three-dimensional (3D)</p>	School of Engineering

				<p>geometry, Cartesian coordinate systems, and the machine coordinate systems used in CNC equipment. The course also develops students' ability to create complete CNC machining programs through both manual NC programming and computer-aided programming using CAD/CAM software.</p> <p>Upon completion of the course, students will be able to interpret and develop NC programs using the standard G-code and M-code programming language, and apply CAD/CAM/CNC technologies in modern manufacturing and automated production systems.</p>	
71	KC387	Industrial Internship in Mechatronics Engineering	2	<p>The Industrial Internship course provides students with supervised practical experience in an industrial environment. Students undertake internships in companies or manufacturing facilities, where they gain first-hand experience of industrial regulations, workplace practices, manufacturing processes, and modern production technologies.</p> <p>The internship enables students to apply the theoretical knowledge and practical skills acquired during their studies to real engineering problems. Through direct exposure to industrial equipment, manufacturing systems, and professional engineering practices, students broaden their technical knowledge, develop workplace competencies, and gain a deeper understanding of the engineering profession.</p>	School of Engineering
72	KC329E	Engineering Projects in Community Service (EPICS)	2	<p>The Engineering Projects in Community Service (EPICS) course provides students with the opportunity to undertake a team-based, community-engaged engineering design project. Students work in multidisciplinary teams (with a maximum of five members, including at least one female student) to identify real-world challenges within the communities where they live, study, or work.</p> <p>Applying the engineering design process, students develop innovative technical solutions that address identified community needs and improve the quality of life of community members. The completed solutions are deployed and evaluated in collaboration with community stakeholders, and user feedback is incorporated to refine and optimize the final design. Through this course, students strengthen their competencies in human-centered design, community engagement, project management, teamwork,</p>	School of Engineering

				communication, and professional engineering practice.	
73	CT398	Fuzzy Control	2	<p>This course introduces the fundamental principles of fuzzy set theory, fuzzy logic, and fuzzy control systems. Students learn the concepts and techniques underlying fuzzy control and explore representative applications of fuzzy logic in engineering and intelligent systems. The course also introduces current research directions in fuzzy systems, providing a foundation for undergraduate research projects and capstone (graduation) thesis projects.</p> <p>In addition to the theoretical content, students gain practical experience in the analysis and design of fuzzy logic controllers using MATLAB and its associated toolboxes. The course also develops students' abilities in independent learning, creative problem-solving, collaborative research, and scientific writing, preparing them for advanced study and research in intelligent control systems.</p>	School of Engineering
74	CT400	Topics in Control Engineering	2	<p>This course provides final-year students with opportunities to explore the latest developments in Control Engineering through a series of expert seminars delivered by invited researchers and industry professionals. The seminars introduce students to current research topics, emerging technologies, industrial applications, and professional experiences in the field of control and automation.</p> <p>Building on the seminar content, each student undertakes an individual project to investigate a selected topic related to contemporary control engineering applications. The course strengthens students' understanding of recent scientific and technological advances while providing career guidance and insight into professional engineering practice.</p> <p>The course also develops students' competencies in lifelong learning, scientific literature review, critical analysis of emerging technologies, team discussion, scientific writing, and technical presentation, preparing them for professional practice and graduate study.</p>	School of Engineering
75	CT384T	Neural Networks and Deep Learning	3	<p>This course provides students with comprehensive knowledge of artificial neural networks (ANNs) and deep learning. It introduces the architecture and operating principles of neural networks, the backpropagation algorithm, optimization techniques for neural network training, and state-of-the-art deep learning architectures, including Convolutional Neural Networks</p>	School of Engineering

				<p>(CNNs), Recurrent Neural Networks (RNNs), Long Short-Term Memory (LSTM) networks, and Transformer models.</p> <p>In addition to the theoretical concepts, students gain practical experience in developing, training, validating, and evaluating deep learning models using modern deep learning frameworks. These techniques are applied to a variety of artificial intelligence tasks, including classification, pattern recognition, prediction, and data processing, with applications in intelligent systems and engineering.</p>	
76	KC586T	Applied Computer Vision	3	<p>Computer Vision is a core area of Artificial Intelligence (AI) concerned with enabling computers to acquire, process, analyze, and interpret visual information from digital images and videos. The course introduces the fundamental theories, algorithms, and applications of computer vision for intelligent systems.</p> <p>Topics include low-level image processing techniques such as image enhancement and filtering; mid-level image analysis techniques including edge detection and feature extraction; and advanced computer vision methods such as image segmentation, image clustering, object detection and recognition, scene understanding, and face recognition.</p> <p>In addition to the theoretical foundations, students gain practical experience in implementing computer vision algorithms using modern software libraries and applying them to engineering and artificial intelligence applications.</p>	School of Engineering
77	CN298ET	Industrial Networks and Communications	2	<p>This course builds upon the knowledge acquired in the Programmable Logic Controllers (PLC) course by introducing the principles and applications of industrial communication networks. It covers industrial communication standards, network architectures, communication media, and the major types of industrial networks used in modern automation and manufacturing systems.</p> <p>Students gain hands-on experience using hardware and software platforms from leading automation manufacturers to configure, analyze, and implement industrial communication systems based on widely adopted industrial communication protocols. Through laboratory exercises and practical applications, students develop the skills required to design, integrate, troubleshoot, and maintain industrial communication networks.</p>	School of Engineering

				<p>used in automated manufacturing and process control systems.</p> <p>Upon completion of the course, students will be equipped with the theoretical knowledge and practical skills necessary for the development and implementation of industrial networking solutions in modern industrial automation.</p>	
78	CN044	Industrial Networks and Communications Laboratory	1	<p>The Industrial Communication Networks Laboratory course provides students with hands-on experience in the configuration, simulation, programming, testing, and performance evaluation of industrial communication systems.</p> <p>Laboratory activities focus on the implementation of industrial communication technologies, including RS-485, Controller Area Network (CAN), and Industrial Ethernet, together with widely adopted industrial communication protocols such as Modbus, PROFINET, and EtherCAT. Students use industry-standard software tools to configure communication devices, monitor network traffic, diagnose communication faults, and evaluate system performance.</p> <p>Through laboratory experiments and team-based design projects, students develop practical skills in system integration, network configuration, communication troubleshooting, technical report writing, and the application of digital technologies and technical English in engineering communication. The course also strengthens students' professionalism, sense of responsibility, teamwork, and problem-solving abilities required for careers in industrial automation and industrial communication systems.</p>	School of Engineering
79	KC552T	Industry 4.0 Technologies	3	<p>This course introduces the fundamental concepts and enabling technologies of the Fourth Industrial Revolution (Industry 4.0). Students gain an understanding of the key technological domains underpinning Industry 4.0, including the Internet of Things (IoT), cyber-physical systems, cloud computing, big data, artificial intelligence, and smart manufacturing.</p> <p>The course covers the architecture, operating principles, and implementation of IoT systems, together with related communication technologies, platforms, and integration issues. Students also examine the opportunities and challenges presented by Industry 4.0 and explore its applications in industrial automation, smart manufacturing, and smart living.</p>	School of Engineering

				In addition to the theoretical foundations, the course develops students' ability to analyze application requirements and propose, design, and implement IoT-based solutions for practical engineering problems.	
80	CT409E	Embedded Programming	3	<p>This course introduces the fundamental principles of embedded software engineering and the development of embedded systems. Students study the hardware and software architectures of embedded systems, embedded software development environments, and the use of professional development tools for designing and implementing embedded applications.</p> <p>Topics include real-time embedded programming, real-time system design, embedded operating systems (RTOS), finite-state machines (FSMs), and serial communication interfaces and protocols. Students also learn how to develop embedded software that satisfies real-time constraints and supports reliable interaction with peripheral devices.</p> <p>Upon completion of the course, students will be able to design, implement, test, and debug embedded software applications using modern embedded development tools and real-time operating systems.</p>	School of Engineering
81	KC519	Graduation Thesis	15	<p>The Mechatronics Engineering Graduation Thesis is a capstone research and design project that enables students to integrate and apply the knowledge and skills acquired throughout the Mechatronics Engineering program. Under the supervision of a faculty advisor, students undertake an independent engineering project involving the analysis, design, development, implementation, testing, and evaluation of a complete mechatronic device, system, or engineering solution that addresses a specified engineering problem.</p> <p>Thesis topics may be proposed by students or assigned by faculty members, provided they are consistent with the student's academic preparation and the supervisor's area of expertise. The thesis culminates in a written dissertation and an oral presentation, demonstrating the student's ability to conduct independent engineering work, apply systematic engineering design principles, and communicate technical results effectively.</p>	School of Engineering
82	KC399	Graduation Project	6	The Mechatronics Engineering Graduation Project provides students with the opportunity to undertake an individual engineering project of moderate scope in a specialized area of Mechatronics Engineering. Under the	School of Engineering

				<p>supervision of a faculty advisor, students investigate a selected engineering topic through theoretical analysis, system design, software development, experimental work, or a combination of these activities, depending on the nature of the project.</p> <p>Project topics may be proposed by students or assigned by faculty members in accordance with the student's academic background and the supervisor's area of expertise. The course enables students to consolidate their technical knowledge, strengthen their analytical and problem-solving abilities, and develop professional skills in project planning, technical writing, and oral presentation.</p>	
83	CN590ET	Artificial Intelligence and Applications	2	<p>This course introduces the fundamental concepts, methodologies, and applications of Artificial Intelligence (AI). Students study the principles of intelligent systems, including knowledge representation, reasoning, search algorithms, and problem-solving techniques, together with the foundations of machine learning and its principal models and algorithms.</p> <p>The course also explores representative applications of AI in computer vision, natural language processing (NLP), and robotics. In addition, students examine current developments in artificial intelligence, including emerging technologies, practical challenges, and the ethical, social, and professional implications of AI deployment. Upon completion of the course, students will have a solid foundation for applying AI techniques to engineering problems and intelligent systems.</p>	School of Engineering
84	KC599T	Global Positioning Technology	2	<p>This course introduces the fundamental principles of the Global Positioning System (GPS) and Global Navigation Satellite Systems (GNSS), together with modern satellite positioning and navigation techniques. Students gain an understanding of GNSS system architecture, positioning principles, signal processing, error sources, and positioning accuracy, providing the theoretical foundation for the design and implementation of satellite-based localization systems.</p> <p>The course prepares students to undertake engineering design and research projects involving satellite navigation and positioning technologies. Representative applications include precision agriculture, autonomous agricultural machinery, outdoor mobile robots, autonomous vehicles, and other engineering systems in which accurate position, navigation, and timing (PNT) information is essential.</p>	School of Engineering

				Upon completion of the course, students will be able to analyze, design, and evaluate GPS/GNSS-based positioning solutions for real-world engineering applications.	
85	KC393	Product Research and Development	3	<p>This course introduces the principles and methodologies of new product development (NPD) and product innovation, emphasizing the integration of engineering, manufacturing, marketing, and business functions throughout the product development process.</p> <p>Students learn the complete product development lifecycle, including opportunity identification, customer needs analysis, concept generation, product design, prototyping, testing, and product launch. The course develops students' ability to participate effectively in cross-functional product development teams, enabling them to identify customer requirements and deliver high-quality, cost-effective products in a competitive market.</p> <p>Upon completion of the course, students will understand the product development process and acquire practical skills in teamwork, project collaboration, customer-oriented design, and product innovation.</p>	School of Engineering
86	CN210	Quality Control	2	<p>This course introduces the principles and techniques of Statistical Quality Control (SQC) for manufacturing and service operations. It focuses on two major areas: Statistical Process Control (SPC) and Acceptance Sampling, providing students with the quantitative tools required for quality improvement and process monitoring.</p> <p>Topics in Statistical Process Control include the design, interpretation, and application of control charts for process monitoring, including attribute control charts, variables control charts, multivariate control charts, and specialized control charts for detecting small process shifts. The Acceptance Sampling component covers both attribute sampling plans and variables sampling plans for product inspection and quality assurance.</p> <p>Upon completion of the course, students will be able to apply statistical methods to monitor process performance, evaluate product quality, support quality improvement initiatives, and make informed quality-related decisions in manufacturing and service environments.</p>	School of Engineering
87	CN414	Industrial Maintenance Engineering Management	2	This course introduces the fundamental principles of maintenance engineering and maintenance management in industrial production systems. Students learn the organization, planning, scheduling, and	School of Engineering

				<p>management of maintenance activities, together with the economic impact of equipment failures and production downtime.</p> <p>The course examines modern maintenance strategies, including Preventive Maintenance (PM), Condition-Based Maintenance (CBM), Predictive Maintenance (PdM), Corrective Maintenance (CM), and Total Productive Maintenance (TPM). Students learn how to evaluate and select appropriate maintenance strategies to improve equipment reliability, maximize system availability, reduce maintenance costs, and enhance Overall Equipment Effectiveness (OEE).</p> <p>Upon completion of the course, students will be able to apply maintenance management principles and reliability engineering techniques to support world-class manufacturing and improve the performance of industrial production systems.</p>	
88	CN542	Engineering Economics	3	<p>This course introduces the fundamental principles and analytical methods of engineering economics. Students learn to apply economic analysis techniques to engineering decision-making, including the time value of money, cash flow analysis, economic comparison of investment alternatives, depreciation methods for fixed assets, corporate income tax analysis, project cost estimation, cost control, and risk analysis.</p> <p>The course also covers the economic evaluation of manufacturing technologies, capital investment analysis, and equipment replacement decisions, enabling students to assess the financial feasibility of engineering projects and select economically optimal solutions.</p> <p>Upon completion of the course, students will be able to apply engineering economic methods to evaluate engineering investments, analyze project costs and benefits, and support decision-making in industrial and manufacturing environments.</p>	School of Engineering
89	CT376E	Industrial Electronics	3	<p>This course introduces the fundamental components and design principles of industrial automation systems. Students study the characteristics and applications of industrial sensors, solid-state switching devices, and industrial actuators, including DC motors, AC motors, stepper motors, and solenoids.</p> <p>The course also covers industrial instrumentation for measuring process variables such as flow, pressure, and force, together with signal conditioning and measurement techniques. Students learn</p>	School of Engineering

				<p>methods for the analysis and design of sequential control systems, including the modeling and implementation of sequential processes and discrete-event systems commonly encountered in industrial automation.</p> <p>Upon completion of the course, students will be able to analyze, design, and implement industrial automation systems by integrating sensors, actuators, measurement devices, and sequential control strategies.</p>	
90	KC378E	Win and Solar Energy Applications	3	<p>This course introduces the fundamental principles, technologies, and applications of renewable energy systems, with particular emphasis on wind energy and solar photovoltaic (PV) energy.</p> <p>The first part of the course focuses on wind energy conversion systems (WECS), including wind resource assessment, wind turbine classification, aerodynamic principles, wind turbine mechanical systems, system modeling, design considerations, and power generation technologies.</p> <p>The second part covers solar photovoltaic (PV) systems, including the principles of photovoltaic energy conversion, the characteristics of solar cells and PV modules, system components, power conversion equipment, system design considerations, and grid-connected and standalone PV applications.</p> <p>Upon completion of the course, students will understand the operating principles, design methodologies, and engineering applications of modern renewable energy systems and will be able to evaluate and analyze wind and solar power generation technologies.</p>	School of Engineering
91	KC564T	Power Electronics for Renewable Energy Applications	2	<p>This course provides advanced knowledge of wind energy systems, solar photovoltaic (PV) systems, power electronic converters, and the control strategies employed in renewable energy generation systems.</p> <p>The course covers the operating principles, mathematical modeling, and control of wind and photovoltaic power generation systems under various operating conditions. Topics include power conversion technologies, DC–DC converters, DC–AC inverters, Maximum Power Point Tracking (MPPT) techniques, grid integration, and control methods for maximizing energy conversion efficiency, maintaining system stability, and ensuring reliable operation under varying environmental conditions.</p> <p>Upon completion of the course, students will be able to analyze, model, and design control</p>	School of Engineering

				systems for renewable energy applications and evaluate the performance of wind and solar energy conversion systems.	
92	KC345E	Modern Control Theory	2	<p>This course provides the mathematical and physical foundations of modern control theory, with emphasis on adaptive control, nonlinear control, and estimation theory. Students develop the analytical tools required to model, analyze, and design advanced control systems for complex dynamic processes.</p> <p>Topics include the mathematical foundations of modern control, adaptive control methodologies, Lyapunov stability analysis for nonlinear systems, and the design of modern nonlinear controllers. The course also covers parameter estimation and nonparametric estimation techniques, providing students with the knowledge required for system identification, state estimation, and advanced control applications.</p> <p>Upon completion of the course, students will be able to analyze nonlinear dynamic systems, evaluate system stability, design advanced control algorithms, and apply estimation techniques to solve complex engineering control problems.</p>	School of Engineering
93	CN596T	Intelligent Control	3	<p>This course introduces advanced methods for the analysis, modeling, and design of intelligent control systems. Students study the architecture and characteristics of intelligent control systems, together with knowledge-based control and data-driven control approaches for complex dynamic systems.</p> <p>The course covers online learning algorithms for artificial neural networks (ANNs) and their application to nonparametric system identification, adaptive modeling, and intelligent control. Students also develop and simulate selected intelligent control algorithms using modern engineering software tools.</p> <p>In addition, the course provides advanced knowledge of AC motor drive control, including constant voltage-to-frequency (V/f) control, Field-Oriented Control (FOC) (also known as vector control), and Direct Torque Control (DTC). These control strategies are analyzed and applied to high-performance AC drive systems under various operating conditions.</p> <p>Upon completion of the course, students will be able to analyze, design, simulate, and evaluate intelligent control systems and advanced AC motor drive control strategies for industrial automation and motion control applications.</p>	School of Engineering

5. Teaching and Learning Methods

The teaching and learning methods are carefully designed to enable students to achieve the Course Learning Outcomes (CLOs), thereby contributing to the attainment of the Program Learning Outcomes (PLOs) and the educational objectives of the program.

Depending on the characteristics of each course and its intended learning outcomes, instructors employ a range of learner-centered teaching approaches and design appropriate learning activities to promote active learning, critical thinking, problem-solving, teamwork, and independent learning.

6. Assessment Methods

Assessment methods are aligned with the course content, teaching and learning strategies, and intended learning outcomes to ensure that students' achievement of the Course Learning Outcomes (CLOs) and Program Learning Outcomes (PLOs) is assessed effectively.

Student learning is evaluated through two main forms of assessment:

- Formative assessment, conducted continuously throughout the learning process to monitor student progress and provide timely feedback; and
- Summative assessment, consisting of midterm and final assessments.

Assessment methods may include:

- Multiple-choice examinations
- Essay examinations
- Quizzes
- Written reports
- Oral presentations
- Laboratory reports
- Individual assignments
- Practical and/or oral examinations
- Graduation project or thesis reports

Course grades are awarded on a 10-point grading scale, rounded to one decimal place, and subsequently converted to letter grades and a 4.0 grade point scale (GPA) in accordance with the University's Academic Regulations.

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**DEAN
FACULTY OF AUTOMATION**

