SELF - ASSESSMENT REPORT FOR AUN-QA

BACHELOR OF ENGINEERING

IN AUTOMATION AND CONTROL ENGINEERING TECHNOLOGY

AUN-QA
A Touch of Quality

The 127th AUN Quality Assessment at Programme Level

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AUN-QA SELF-ASSESSMENT REPORT

of the Bachelor of Engineering in

AUTOMATION AND CONTROL ENGINEERING TECHNOLOGY

We hereby confirm to approve this AUN-QA Self-Assessment Report of the Bachelor of Engineering in Automation and Control Engineering Technology programme for assessment according to AUN-QA Criteria (V3.0).

Assoc. Prof. Nguyen Minh Tam

Dean

Faculty of Electrical and Electronics Engineering

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LIST OF ABBREVIATIONS

No.	Abbreviations	Explanations
1	AAO	Academic Affairs Office
2	ACD	Automation Control Department
3	ACET	Automation and Control Engineering Technology
4	ASAO	Admission and Student Affairs
5	ASU	Arizona State University
6	AUN	ASEAN University Network
7	CDIO	Conceive - Design - Implement - Operate
8	DLC	Digital Learning Center
9	ELOs	Expected Learning Outcomes
10	EXH	Exhibition
11	FEEE	Faculty of Electrical and Electronics Engineering
12	FTE	Full-Time Equivalent
13	GPA	Grade Point Average
14	HEEAP	Higher Engineering Education Alliance Program
15	HCMUTE	Ho Chi Minh City University of Technology and Education
16	HCC	Health Care Center
17	HQL	High-Quality Library
18	LMS	Learning Management System
19	HCMUT	Ho Chi Minh University of Technology
20	ITEC	Indian Technical and Economic Cooperation
21	ISO	International Organization for Standardization
22	KPI	Key Performance Indicator
23	MOET	Ministry of Education and Training
24	QAO	Quality Assurance Office
25	PEO	Programme Education Objectives
26	PC	Personal Computer
27	PLC	Programmable Logic Controller
28	PDCA	Plan-Do-Check-Act
29	SSC	Student Services Center
30	SAC	Scientific Academic Committee
31	SAR	Self-Assessment Report
32	SHTP	Saigon Hi-Tech Park
33	TA	Teaching Assistant
34	UTE-TV	University of Technology and Education-Television
35	YU	Youth Union
36	YUSA	Youth Union and Students Association

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PART 1: INTRODUCTION

- Programme: **Automation and Control Engineering Technology (ACET)**
- Institution: **Ho Chi Minh City University of Technology and Education (HCMUTE)**
- Faculty: **Faculty of Electrical and Electronics Engineering (FEEE)**

1. Executive Summary

The Automation and Control Engineering Technology (ACET) programme objectives were well defined to align with the framework of the mission of the Faculty of Electrical and Electronics Engineering (FEEE) as well as the mission of Ho Chi Minh City University of Technology and Education (HCMUTE). These objectives were designed to provide students not only a solid background in mathematical principles and the fundamental concepts of electrical and electronics but also a knowkedge in automation and control engineering technology and skills to be able to continue professional development throughout their careers as well. Moreover, in order to enter a new era of rapidly increasing economic globalization these programme objectives are also providing interdisciplinary teaming and communication skills for students to prepare graduates to function effectively and responsibly in a diverse environment.

The present Self-Assessment Report (SAR) of the ACET programme is a product of SAR team of ACET with the support from HCMUTE, all faculty members and experts. It is an evidential document describing the quantitative and qualitative assessment of the strengths and limitations of the ACET programme for ASEAN University Network – Quality Assurance (AUN–QA) standards (V3.0) accreditation.

2. Organization and Approach of Self-Assessment Report

For completing the SAR for ACET programme, a SAR team was formed in July 2017 including Dean Board, Department Heads of the Faculty, faculty members and staffs to collect data for evidence. Each team member was assigned to write one or two criteria. After the team leader has finalized the SAR (Version 1) in April 2018, it was sent to all faculty members and Quality Assurance Office (QAO) of the university for feedback. The second version which reflects the feedbacks of faculty members and QAO was finished in August 2018.

This report is organized as follows. The introduction of HCMUTE, FEEE, and ACET including the history, vision, mission, and core value are presented in Part 1. In Part 2, 11 criteria of the AUN-QA is written up to fulfill the requirements of the AUN-QA criteria. The analysis of the strengths and weaknesses are also shown in Part 3. Finally, the appendices, supporting documents and evidence are listed in Part 4.

3. Brief History of the University

Ho Chi Minh City University of Technology and Education (HCMUTE) was founded in 1962 with the first purpose of technical teacher training. After 56 years of development, HCMUTE now has been one of the leading higher education institutions in training vocation teachers and qualified engineers for industry. The university currently has more than 25,000 full-time undergraduate students with 36 undergraduate programmes. It has supplied qualified human resource in technical areas in both undergraduate and postgraduate levels. The quality policy of HCMUTE is stated as "Always enhance the quality of teaching, learning, and scientific research to supply the best condition

to the learners for comprehensive development of competence, so that respond to not only the needs of national economic/social development but also the international integration".

HCMUTE development strategy is to become the top technical university in Vietnam and some of the educational training areas are equal to that of the regional prestigious universities. It also becomes the multidiscipline university where its graduates find the suitable jobs and maximize their ability to devote to society. The curriculum of HCMUTE is highly adaptable and its qualifications are widely recognized in Vietnam.

Vision, mission, and core values of HCMUTE

The vision and mission of the HCMUTE are published on the HCMUTE website (http://en.hcmute.edu.vn) and formulated as follows.

- **Vision:** Ho Chi Minh City University of Technology and Education will become a leading center for training, research, innovation and entrepreneurship in Vietnam, on a par with reputable universities in the region and the world.
- **Mission:** Being a leading institution for training, research, and technology transfer in Vietnam. Continuously innovating, providing high-quality human resources and scientific products in vocational education, science, technology to satisfy the socio-economic development demand of our country and the region.
- **Core values:** The core values of a progressive and modern education which have always been and will be appreciated, preserved, and creatively implemented by HCMC University of Technology and Education are:
  - Upholding and implementation of Vietnamese people's humane traditional values.
  - Cultivation of talent and creativity, with a focus on training professional skills and responsibility.
  - Respect for the learners and the community's benefits and building an ever- learning society.
  - High regard for quality, effectiveness, and innovation in activities.
  - Integration, cooperation, and sharing.

The organizational structure of HCMUTE

HCMUTE consists of 15 academic faculties, 19 functional offices, 15 centers as shown in **Figure 1**. All the faculty boards (including the dean and vice deans), and the head/vice heads of academic departments hold Ph.D. degrees or Associate Professor titles. The presidential board includes the university president and two vice presidents, who support the president to lead all activities of the university. The Academic and Scientific Committee is responsible to support the presidential board with all the activities related to academic affairs. The University Council is an ownership representative of the university and its function is to administrate the organization. The university Council is responsible for making decisions about the orientation of activities; mobilizing resources for the university; monitoring the activities of the university; linking the university with community and society; ensuring the implementation of the educational objectives and autonomy, and taking responsibility for university actions complied with relevant laws.

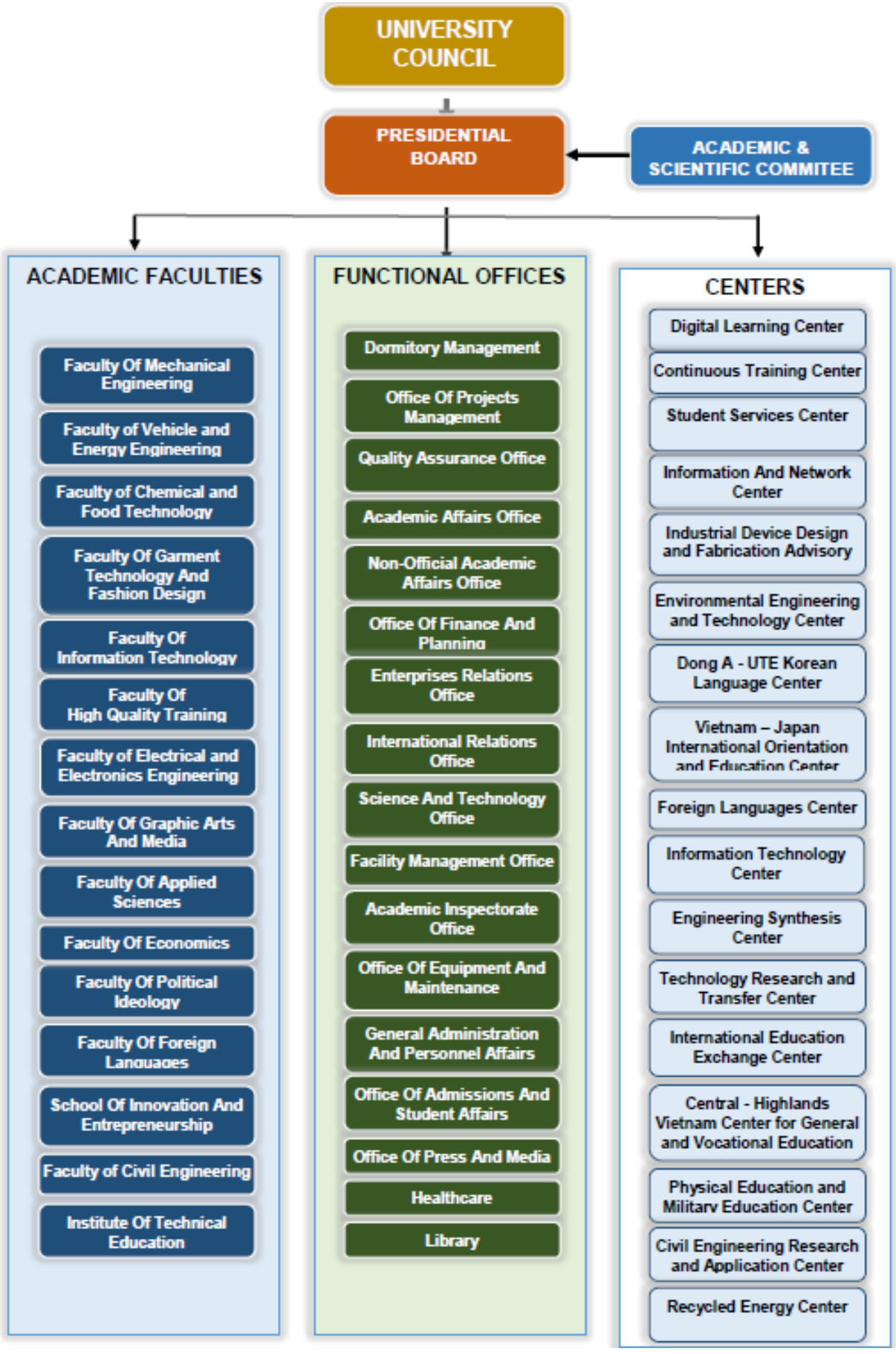


Figure 1. The organizational structure of HCMUTE

Quality assurance system of HCMUTE

Quality policy of HCMUTE: Continuously upgrade the quality of teaching, learning and scientific research to provide students with the best conditions to develop comprehensively their professional skills in order to satisfy the demands of society and international integration.

Quality assurance office (QAO): Quality Management Unit was embedded in the Academic Affair Office (AAO) before 2008. QAO was established in 2008 according to Ministry of Education and Training (MOET)'s regulation in order to improve the educational quality in the whole university. QAO takes responsibility for quality management according to International Organization for Standardization (ISO) 9001 standard with a system of 42 procedures, develop internal quality assurance system, and do a quality assessment as well as accreditation at the institutional level and programme level in accordance with national, regional, and international standards.

QAO has six staffs who regularly attend the QA training courses annually to continue improving our internal quality assurance system based on the AUN-QA model. HCMUTE also has 01 member who is the AUN assessor and 05 education accreditor of Department of Education Testing and Accreditation (belong to MOET) from 2014. The main milestone of QA activities and results from 2005 are in **Table 1**.

Table 1: Overview of the assessment/accreditation of HCMUTE

Year	Programme / Institution	Assessed / Accredited by
2005	Quality Accreditation at Institutional level	MOET
2007	Quality management certification	ISO 9001
2011	External Assessment of TVET in EEE	MOET
Mar. 2016	AUN-QA Assessment at Programme level: *1. Automotive Engineering Technology* *2. Electrical and Electronics Engineering Technology* 3. *Mechatronics Engineering Technology*	AUN - QA
Nov. 2016	Quality Accreditation at Institutional level	MOET
Dec. 2016	AUN-QA Assessment at Programme level: *1. Construction Engineering Technology*	AUN - QA
Nov. 2017	AUN-QA Assessment at Programme level: *1. Machine Manufacturing Technology* *2. Thermal Engineering Technology* *3. Electronics Communication Engineering Technology* *4. Environmental Engineering Technology*	AUN - QA
Dec. 2018	AUN-QA Assessment at Programme level: *1. Mechanical Engineering Technology* *2. Automation and Control Engineering Technology* *3. Industrial Management*	AUN - QA (in the process)

4. Faculty of Electrical and Electronics Engineering

Overview

The Faculty of Electrical and Electronics Engineering (FEEE), which was founded in 1976 and is recognized as one of the best faculties for undergraduate electrical and electronics engineering

training in Vietnam. Currently, FEEE has six academic departments, 37 modern laboratories with nearly 100 academic staff including 11 associate professors, 22 lecturers with PhD degrees, and 20 lecturers who are studying abroad. In addition, FEEE is also supported by many inviting lecturers and associate professors from the other universities and research institutes.

Presently, FEEE has about 4500 undergraduate students, 200 postgraduate students with 5 undergraduate programs, 3 master degree programmes, and 2 doctoral degree programmes. FEEE also offers joint degree programme with Sunderland University of the United Kingdom. FEEE is supported by more than 30 agencies, domestic, and foreign corporations in providing professional and practical skills for students. Approximately 90% of FEEE graduates are employed within 3 months of graduation. Graduates have been highly appreciated by both domestic and foreign employers, and have held important positions in research institutes, professional education organization, corporations and the industry.

The development development objectives of FEEE are (1) to become a leading faculty in training, scientific research, and technology transfer in the field of electrical and electronics engineering in Vietnam, approaching regional and international standards; (2) to train qualified human resources to meet the needs of the industrialization and modernization of the country; (3) to build a friendly, dynamic, creative, and effective environment in teaching and learning. In this report, the Automation and Control Engineering Technology (ACET) programme will be described.

Vision and mission of FEEE

A. Vision

To become the leading faculty in engineering education, scientific research, technology transfer, and service in Vietnam, and approaching regional and international standards.

B. Mission

The mission of FEEE is:

- To provide students with the best learning environment for acquiring knowledge, skill, and attitude from real-life problems.
- To conduct scientific research and technology transfer.
- To provide high-quality human resources for the industrialization and modernization of the country;
- To integrate internationally.

Brief History of the ACET Programme

The ACET programme is originally a branch of the 42 years old Electrical and Electronics Engineering Programme. In 2005 with the requirements of the industrial manufacturing and automation system in Vietnam, ACET programme was separated to provide high-quality automatic control engineers serving for the industrialization and modernization of the country and international integration. Since then, this programme has been continuously improved in order to meet the demands of automation and control engineering industry. The programme curriculum aims to provide students with advanced knowledge in Automation and Control Engineering Technology to work in Vietnam, regionally, or internationally, develop career, or to continue post-graduate education.

The objectives of the programme:

- Graduates can effectively utilize foundational knowledge in mathematics, science, and engineering technology with modern tools to solve automation and control engineering problems

as well as related industrial interdisciplinary problems.

- Graduates possess self-confidence and communication skills to build successful careers, participate effectively in multidisciplinary teams, and continue life-long learning.
- Graduates can perform high levels at work while adhering to ethical and professional standards.
- Graduates continuously expand their knowledge and skills through professional activities and training in the design, development, and manufacturing process in the automation and control engineering technology field.

These programme educational objectives are aligned with the mission of FEEE and HCMUTE. Engineers graduated from the ACET programme have basic scientific knowledge, fundamental knowledge, specialized knowledge of automation and control technology, analysis capability, problem solving skills and solutions assessment, ability to operate automation and control systems, as well as communication skills, and teamwork, professional attitudes, meeting the development requirements of the industry and society.

The career opportunities of ACET students are to become a technical expert or designer in automation and control engineering. They can also work as a sales engineer as well as an industrial maintenance engineer, or they can work in the ACET education organizations.

Because this ACET programme is the third programme of FEEE to be assessed by AUN-QA, we has improved the curriculum, stakeholder input garthering, teaching and learning assessment, etc. Therefore, we would like to thank for the helpful feedback of assessors from other two programmes that have been assessed by AUN-QA.

Organization of the ACET Self-Assessment Report

The Self-Assessment Report (SAR) was prepared by the SAR team, including FEEE faculty board, all the members of the Automatic Control Department, and some other faculty members. All the writing parts of SAR consisting of Introduction, 11 criteria, Analysis of the strengths and weaknesses, and Appendices were distributed to the SAR team members. To write SAR effectively, all members were required to attend all meetings organized by the QA office to fully understand the AUN-QA criteria, then complete their assigned parts. The head of the department summarized the final version of SAR to be ready for AUN-QA assessment. Not only SAR team members but also some other FEEE faculty members participated in completing this document.

For further information on this document or other related materials please contact:

Associate Professor Truong Dinh Nhon, *Ph.D.*

Head of Automatic Control Department (ACD)

Email: nhontd@hcmute.edu.vn, Tel: +84-903675119

PART II: AUN-QA CRITERIA AT PROGRAMME LEVEL

1. Criterion 1: Expected Learning Outcomes

1.1. The expected learning outcomes have been clearly formulated and aligned with the vision and mission of the university

The ACET programme educational objectives (PEOs) are aligned with the vision and mission of FEEE and HCMUTE which are shown in **Table 1.1.**

Table 1.1: Alignment between PEOs of the ACET programme with FEEE and HCMUTE mission and vision

PEOs of the ACET programme: *ACET graduates are able to:*	**FEEE's mission and vision**	**HCMUTE's mission and vision**
PEO-01: Effectively utilize fundamental mathematic, scientific, and engineering technology principles together with modern tools in solving automation and control engineering problems.	Become outstanding in engineering education, scientific research, technology transfer, and service in Vietnam, and gradually reach to the regional and international levels.	Be a leading institution in training, research, creativity, innovation, and entrepreneurship in Vietnam.
PEO-02: Have self-confidence in technical and management skills, roles of responsibility in professional activities, participating effectively in multidisciplinary teams and appreciate the importance of life-long learning.	Provide students with the best learning environment for acquiring knowledge, skills, and attitude from real-life problems.	Provide human resources with high quality in many fields for economic-social development.
PEO-03: Adapt effectively in the professional environment, leadership, and teamwork in the context of automation and control engineering to fulfil the needs of society.	Provide high-quality human resources for the industrialization and modernization of Vietnam, and the international integration.	Provide human resources with high quality to meet the demands of the economic-social development of Vietnam and the region.
PEO-04: Apply these knowledge and skills via professional activities and training in the design, development, and manufacturing process in the automation and control engineering technology field.	Conduct scientific research and technology transfer for the industrialization, modernization of Vietnam and the international integration.	Be a leading institution in training, research, creativity, innovation, and entrepreneurship in Vietnam.

The ACET programme objectives are translated into seventeen Expected Learning Outcomes (ELOs) as shown in **Table 1.2**.

Table 1.2: The subject generic and specific ELOs of ACET programme

PEOs	ELOs *After finishing the ACET programmes, graduates will have:*	Generic	Specific	Attitudes/ Awareness
01	**ELO-1.1**: An ability to apply knowledge of mathematics, science, information technology, and engineering.	✓		
	ELO-1.2: An ability to analyze the fundamental knowledge of automation and control engineering.		✓	
	ELO-1.3: An ability to analyze advanced knowledge of automation and control engineering.		✓	
02	**ELO-2.1**: An ability to analyze and solve the problems of the automation and control engineering field.		✓	
	ELO-2.2: An ability to identify, formulate and solve engineering problems to design a system, component, or process to meet desired needs.		✓	
	ELO-2.3: An ability to select possible solutions for automation and control engineering within the context of society, enterprise and technique.		✓	✓
	ELO-2.4: A recognition of the importance of the global, economic, environmental and societal context in automation and control engineering to engage in life-long learning.	✓		✓
	ELO-2.5: An ability to perceive professional practice skills in automation and control engineering including professional and ethical responsibility.	✓		✓
03	**ELO-3.1**: An ability to evaluate the goals and characteristics of individuals to engage technical collaboration with team members in multi-disciplinary projects.	✓		✓
	ELO-3.2: An ability to select various communication skills in both technical and none technical environments.	✓		
	ELO-3.3: An ability to demonstrate the capacity to use English in automation and control engineering with the emphasis on reading and writing skills.	✓		
	ELO-4.1: An ability to judge the impact of automation and control engineering solution in global, economic, environmental, and societal context, and vice versa.		✓	✓

04	**ELO-4.2**: An ability to adapt different enterprise and business cultures to develop professional behaviors for the success.		✓	✓
	ELO-4.3: An ability to propose appropriate systems in automation and control field to match the realistic demands.		✓	
	ELO-4.4: An ability to use the techniques, skills, and modern engineering tools to design a part or complete automation and control systems.		✓	
	ELO-4.5: An ability to participate in the development, organization, operation, and management of automation and control projects effectively.		✓	
	ELO-4.6: An ability to operate the automation and control systems in the factory including inspection, maintenance, repair, and upgrade.		✓	

Those 17 programme ELOs were formulated in 2011 and then revised in 2016 following HCMUTE procedures for curriculum development/design and revision *[Exh. 1.1: ISO procedures for curriculum development]*. They were formulated by combining the requirements of MOET, analyses of social demands, and feedbacks from stakeholders including employers, industrial consulting experts, lecturers, alumni, and students.

The formulated ELOs were also mapped against the CDIO (Conceive – Design – Implement – Operate) curriculum which is a good approach for curriculum design for engineering programmes and has been used by many universities in the US and Europe such as MIT, The University of Colombo, Purdue University, Chulalongkorn University, International University.

The ELOs are communicated to stakeholders such as MOET, students, lecturers, staffs, alumni and employers through university, faculty and department website or printed version as the posters at faculty and department. In addition, ACET ELOs are introduced and explained clearly to freshmen in the first semester in the course "Introduction to automation and control engineering technology (ACET)". Students can also read ELOs on the faculty website *[Exh. 1.2: Website of FEEE faculty and department]*.

1.2. The expected learning outcomes cover both subject specific and generic (i.e. transferable) learning outcomes

The ACET ELOs are categorized into generic and specific knowledge and skills, attitude and awareness as demonstrated in **Table 1.2**. The balance of specific and generic learning outcomes ensures the ACET programme produces T-shaped engineers who can become experts in the automation and control engineering fields as well as work with people from other disciplines in the workplace.

A matrix that shows the relationship between programme ELOs and courses was developed to ensure all programme ELOs could be achieved through the courses. Based on this matrix, course syllabi design followed a procedure to ensure they are constructively aligned with the ELOs of the programme. Student assessment and teaching and learning activities are chosen in according to the nature of each ELO.

ELOs related to soft skill communication, teamwork, leadership and professional ethics are integrated into almost all the courses through the student-centered teaching and learning activities and extra-curricular activities. For example, "Introduction to Automation and Control Engineering Technology

(ACET)" course for freshmen students introduces students to the prospect of the professions, the knowledge, and skills they need to acquire to be successful in which soft skills and ethics are introduced and practiced. Teaching and learning activities for this course include soft skills practices such as presentation, teamwork activities to finish a small and fun project, writing a technical report, visiting laboratories and factories. Soft skills students first learn and practice in this introductory course would be practiced in the whole curriculum. Those soft skills could be also achieved through various extra-curricular activities such as English clubs, research competitions, sports competitions, student clubs, voluntary activities, etc. These activities would be described in detail in Criterion 8.

Each student is required to do an internship in a company where the students can apply the knowledge and skills to complete a report on the practical activities. The social activities are organized by the university such as blood donation, Green Summer campaign, visiting orphans and Vietnamese heroic Mothers. Many soft-skills seminars are open for students such as time management, organizational, and teamwork skills *[Exh. 1.3: Extra activities]*.

Table 1.3: Mapping between the social activities, visiting factories, internship and ELOs

Activities	ELOs																
	1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5	3.1	3.2	3.3	4.1	4.2	4.3	4.4	4.5	4.6
Social activities								✓	✓	✓			✓				
Visiting factories							✓	✓		✓		✓	✓	✓			
Internship	✓	✓	✓	✓	✓			✓		✓		✓					✓

1.3. The expected learning outcomes clearly reflect the requirements of the stakeholders

Outcome-based education was first introduced in Vietnam higher education around 2009 and the then programme detail objectives were formulated into ELOs. In 2012 curriculum, ACET ELOs were clearly formulated to reflect the requirements from different stakeholders including MOET through the Education Law, employers and alumni. The main reason for the separation of the engineering curriculum and teaching certificate in the 2005 curriculum was that most of ACET alumni would work in the industry, not in the vocational school and colleges due to the huge demand of high-quality human resource in the automation and control engineering fields as well as the opportunities in career paths. ACET graduates were highly praised for their soft skills that came from the teaching certificate curriculum that provided students opportunities to learn how to work with others and practicing communication skills. Those skills were clearly stated in the ACET ELOs from 2012 and were integrated into all the courses through teaching and learning activities and enhance student extra-curricular activities.

Often, feedbacks of stakeholders are collected by surveys, seminars, and meeting. At FEEE annual Alumni Day in November which has been organized consecutively since 2008, all invited ACET alumni will carry out the surveys to provide feedback on ACET programme. ACET employers were invited to provide feedback on the quality of ACET graduates as well as their requirement during the conferences on curriculum design and revision in 2012 and 2016 and 2018. The Head of Department or Head of Enterprises Relations Office (ERO) is also in charge of sending the invitation letters of the survey to employers. Employers also give inputs on the need of industry for ACET graduates in general at various events such as semi-annual job fairs, many industry Tech Show held in Ho Chi Minh City, technology workshops and events where ACET lecturers are invited. Inputs from those events are given in an informal way but are valuable for curriculum design and revision.

Lecturers were also required to take part in the conferences on curriculum design and revision, and department meetings to discuss the formulated ELOs. All feedbacks were analyzed and discussed by the Scientific Academic Committee (SAC) of faculty that gave the decisions to modify the ELOs *[Exh. 1.4: Meeting minute of the Academic Scientific Committee to analyze the ACET ELOs]*.

Inputs and contributions from labor market are carefully considered to improve the programme. Based on the survey results of stakeholders as well as informal feedback, most requirements are focused on technical knowledge, English ability, and soft skills of graduates as described in **Table 1.4**. The percentage of new graduates who just finish the programme for 3 months but have found jobs is quite significant, ranging from 54.1 to 61.9 in the last 5 years. When those new graduates come back for the graduation ceremony, they are required to take part in an online survey in which they are asked about their strengths and weaknesses in knowledge and skills. Up to 95 percent of newly graduate take part in this survey so the feedback is reliable. The ELOs are formulated to ensure that the ACET programme regularly reflects the requirements of all stakeholders *[Exh. 1.5: Workshop evaluating the 2012-year curriculum]*.

Table 1.4: Requirements of stakeholders and improvements

Stakeholders	Specific requirements	University and FEEE actions	ELOs
Enterprise	A few graduate students need to be trained in a short time.	Making the contents of the courses more practical and updating. The active teaching and learning methods are used to become more realistic and attractive.	**ELO-1.3**: An ability to analyze advanced knowledge of automation and control engineering
Lecturer	Lack of ability of time management.	Students are requested to work in group/team, report on the results. The duty is divided clearly into the group members.	**ELO-2.5**: An ability to perceive professional practice skills in automation and control engineering including professional and ethical responsibility.
Alumni	Lack of ability of critical thinking, making independent decisions.	Diversifying the career paths by adding selectively the professional elective courses.	**ELO-3.1**: An ability to evaluate the goals and characteristics of individuals to engage in technical collaboration with team members in multi-disciplinary projects.
Students	Students have some difficulty in communication with external partners of foreign companies.	Improve the English skills of students in the courses. Students use the English textbooks and are required to have an English report.	**ELO-3.3**: An ability to demonstrate the capacity to use English in automation and control engineering with the emphasis on reading and writing skills.

2. Criterion 2: Programme Specification

2.1. The information in the programme specification is comprehensive and up-to-date

The programme specification of the ACET programme is clearly described in the documents for opening a programme required by the MOET with the following information *[Exh. 2.1: Programme specification]:*

- Awarding institution: Ho Chi Minh City University of Technology and Education.

- Teaching institution: Faculty of Electrical and Electronics Engineering.
- The name of the final award: Bachelor of Engineering in Automation and Control Engineering Technology.
- Programme title: Automation and Control Engineering Technology.
- Duration of study, number of credit hours.
- Expected learning outcomes: presented in **Table 1.2**.
- Admission criteria or requirements for the programme.
- The programme structures and curriculum map.
- Course descriptions.
- Teaching and learning strategies.
- Student assessment methods.
- Career prospects.
- Date on which the programme specification was written first on 28/07/2012, modified in 2014 and 2016.

The programme structures and curriculum map show how the blocks of knowledge are progressively taught for students and the relationship amongst the courses. Teaching and learning strategies and student assessment methods stated in the programme specification provide students and other stakeholders such as employers the general ideas of how students are taught and assessed.

The curriculum is revised periodically every two years. The improvement includes modifying teaching method as well as the content of courses to accommodate the technology trends. In 2014 and 2016, this programme was modified to improve English skills of students. Elective courses and contents are updated to catch new technology in robotics and automation control including artificial intelligence *[Exh. 2.2: The minute of meeting of the workshop in 2014 and 2016]*. Student admission has also been changed due to MOET regulations hence the programme specification was updated accordingly.

2.2. The information in the course specification is comprehensive and up-to-date

The course specification follows a common standard for the whole programme. The syllabus form contains items explaining how a course contributes to ELOs *[Exh. 2.3: Sample syllabus and a minute of department meeting for revision of the syllabus]*.

The course specification consists of the following information:

- Course title: Written in both English and Vietnamese.
- Course requirement: The number of credits, time requirement for lecture/laboratory/practicum and self-study, prerequisites of the course.
- Lecturer name: Name of lecturers in charge of giving the lecture.
- A brief description of the course: Key contents which will be covered in the course.
- The course goal: Describing the course contribution to ELOs including knowledge, skills and attitudes.
- Course learning outcomes: Using Bloom's taxonomy to describe students' achievement after completing this course.
- Textbooks or references: All textbooks and reference materials are listed.
- The course assessment: The formative assessment of 50% total grades and summative assessment of 50% total grade.
- Detail contents of the course: Contents of the courses, teaching and learning methods, assessment, and homework for students.
- Date when course specification was written/modified/revised.

Reviewing the course specification is implemented through department meetings. The course specification is discussed among lecturers and the department to revise if necessary. The teaching and learning method and assessment method are agreed between lecturers who teach the course. Students give feedbacks when the course is over. The feedbacks from students and alumni are collected and considered for improvement. At the end of the semester, the department will organize the meeting of lecturers to collect their feedbacks. The course specification is updated and modified if necessary based on this information *[Exh. 2.4: Lecturer portfolio and students' feedbacks]*. The last few years has witnessed the significant changes in teaching and learning as well as student assessment. Part of the reasons is the widespread use of learning management systems (LMS) as well as the training on flipped classroom technique, student centered learning and teaching, course assessment, etc. for lecturers.

2.3. The programme and course specifications are communicated, and made available to the stakeholders

The ACET programme and course descriptions have been published on the faculty website where all stakeholders can access easily. The course descriptions including teaching and learning methods can be accessed via an online enrollment system where students plan, select, and enroll for future courses. Besides, the programme specification in the form of brochure is delivered at the Job fairs for employers, annual Open Day for high school students, Consultant events for high school students at high schools across the South of Vietnam *[Exh. 2.5: The learning plan announcement for new students]*.

Furthermore, lecturers introduce the course syllabi to students to make sure that the students clearly know the CLOs and their relationship to ELOs, contents, assessment methods, teaching and learning strategies on the first day of the courses. This information is also available on the E/M learning management system of the course where the students can access anywhere and anytime *[Exh. 2.6: Information about syllabus posted in LMS]*. To ensure that lecturers have to communicate course specification to students on the first day of the course, the student evaluation questionnaire includes the question whether or not course syllabus is discussed with students.

3. Criteria 3: Programme Structure and Content

3.1. The curriculum is designed based on constructive alignment with the expected learning outcomes

The ACET curriculum is designed based on the 17 programme ELOs using the constructive alignment principles. Achievement of the programme ELOs is ensured through the theory, practice, project courses, and graduation thesis (final thesis) and other student activities. Each course syllabus is constructively aligned with the programme ELOs that each course supports from its content, student assessment to teaching and learning activities. CLOs must align with the programme ELOs and then the contents of each chapter, exercises, and tests need to be aligned with the CLOs *[Appendix 5]*.

Teaching and learning activities are chosen based on the types of the CLOs and the level of learning. For example, to ensure students achieving communication skills both in written and verbal, group discussion and presentation in classes, writing project report, graduation thesis, presentation for the project and thesis defense, etc. are utilized. Another example is that the CLOs relate to "design" which would require independent study, including simulation with a computer, doing research for their research project or graduation thesis in which the product or a procedure of testing is required.

To ensure every ELO is achievable, a correlation matrix showing the relationships between courses and programme ELOs was carefully discussed and developed as shown in **Appendix 2**. Based on this correlation matrix, course syllabi were developed in which each course learning outcome (CLO) is mapped against each ELOs. Constructive alignment between programme ELOs and ACET

curriculum is achieved not only with the alignment of curriculum content but also the student assessment methods and teaching and learning activities. Student assessment, teaching and learning activities are chosen in alignment with CLOs as shown in **Table 3.2** and **Table 3.3**. For example, ELO-4.4 "An ability to use the techniques, skills, and modern engineering tools to design a part or complete of the automation and control systems" could be achieved through a series of courses from Automatic Control Systems, Digital systems, Microprocessor, at fundamental levels, Programmable Logic Controller, Data Transmission and PLC Networks, Advance Automatic Control Systems at intermediate levels and then Project 1 (Microprocessor systems), Project 2 (Automatic control systems) and Project 3 (Process control system using PLC and HMI) and finally with internship and graduation thesis where students will have hands-on experiences in the real working environment and design a process control system for an industry application.

Students could achieve ELOs related to soft skills such as ELO-2.4, ELO-3.1, ELO-3.2, and ELO-3.3 through student-centered teaching and learning activities and student assessment such as group discussion, presentation, small projects, project and thesis report, and presentation. Those skills are introduced to freshmen students in the first semester through the course Introduction to ACET, and then students enhance those skills throughout the curriculum as they are integrated into the teaching and learning activities in most courses. For example, in the course Project 1, Project 2, Project 3, and graduation thesis, students will not only apply engineering design process to design a process control system but also enhance their technical report writing, teamwork skills, and presentation skills. **Table 3.1** shows examples of how the ELOs are achieved through the courses, teaching and learning activities, and student assessment.

Students can also enhance their soft skills through extra-curricular such as student clubs, English speaking club, research competitions, student activities organized by FEEE and HCMUTE Youth Union. The detail extra – curriculum will be described in Criterion 8.

Table 3.1: The achievement of ELOs through the courses and activities

ELOs	Courses	Content	Student assessment	Teaching and learning
ELO-1.1 ELO-1.2 ELO-2.2	Digital systems	- The basic logic gates, the fundamental theorems of Boolean algebra, the combinational circuits, sequential circuit.	Individual paper assessment in class, Online test quiz	Lecture, Discussions, Explicit Teaching
ELO-1.3 ELO-2.2 ELO-2.5	Data acquisition system and SCADA	- The structure, classification, and application of the data acquisition system and control. - The SCADA system and some specific software to design the SCADA system.	Teamwork, Individual paper assessment in class	Lecture, Discussions, Problem Solving.
ELO-2.4 ELO-2.5 ELO-3.1 ELO-3.3 ELO-4.4	Project 3	- Use PLC to solve some requirements from industry. - Helps students train their abilities to work in group research documents, write reports, and make a presentation.	Teamwork, Reports, Presentations	Discussions, Case Studies, Problem Solving, Research Projects.

3.2. The contribution made by each course to achieve the expected learning outcomes is clear

As described in sub-criterion 3.1, the Correlation matrix (**Appendix 2**) clearly shows to which programme ELOs a course must contribute. Each course often contributes 3 - 5 ELOs. The Correlation Matrix also shows the level of contribution of each course for a particular programme ELOs. As mentioned in Sub-criterion 3.1, the course syllabus design is based on this Correlation Matrix. Each CLO has to be formulated in alignment with the ELO and the level it contributes. **Table 3.2** shows an example of how the CLOs are aligned with the ELOs the course contributes. The Correlation Matrix is regularly revised to ensure there is a balance of a number of courses supported for each ELO. Once this matrix is revised, the relevant course syllabi have to be revised accordingly.

Table 3.2: The alignment between course learning outcomes and the programme ELOs for Microprocessor course

Programme ELOs	Course Learning Outcomes	Student assessment methods	Teaching and learning activities
ELO-1.1	G1.1, G1.2, G1.3	Teamwork, Online, Quizzes	Lecture, Explicit Teaching, Discussion
ELO-1.2	G1.1, G1.2, G1.3	Paper test	Work Assignment, Research Projects
ELO-2.1	G2.1, G3.2	Teamwork, Online	Computer-Aided Instruction
ELO-2.2	G1.4, G4.2	Online, Individual paper assessment	Problem Solving, Peer Learning
ELO-3.2	G21, G3.1, G4.2	Team work, presentation	Simulations, Case Studies

Fundamental courses will contribute to some ELOs at Introduction level or Medium level whereas advanced courses for third year and four-year students may contribute those ELOs at a High level as well as ELOs at the highest level of Bloom's Taxonomy. For example, Electric Circuits and Basic Electronics courses support to ELO-1.1 and ELO-1.2 at the introductory level because those fundamental courses provide students with basic knowledge of electric circuit analysis and electronic principles. In Digital Systems course, students will learn of the digital devices and systems which principles are based on the knowledge and circuit analysis skills they have learned from Electric Circuits and Basic Electronics courses, hence Digital Systems course support ELO-1.1 and ELO-1.2 at a medium level. In Microprocessor, Microprocessor in Practice, and Project 1 courses, students will learn to design a practical system using microprocessors which principles are mostly based on the Digital Systems, hence this course contributes to ELO-1.1 and ELO-1.2 at the highest level, which means students can fully achieve these ELOs after they fulfill those advanced courses. The graduation thesis contributes to ELOs related to design and soft skills at the high level as those knowledge and skills are intensively applied and assessed. **Table 3.3** shows the contribution of those courses to ELO-1.1 and ELO-1.2.

Table 3.3: The mapping between the courses and ELOs for courses related to process control system design

Subject name	ELOs																
	1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5	3.1	3.2	3.3	4.1	4.2	4.3	4.4	4.5	4.6
Basic Electronics	✓	✓			✓						✓				✓		
Digital Systems	✓	✓		✓	✓	✓					✓						
Microprocessor in Practice	✓	✓	✓	✓	✓					✓					✓		
Graduation Thesis	✓	✓	✓	✓	✓			✓		✓	✓			✓	✓		

3.3. The curriculum is logically structured, sequenced, integrated and up-to-date

The curriculum is logically structured

The ACET curriculum consists of basic courses, fundamental courses, specialized courses, and a graduation thesis. Students can finish the ACET programme in 4 years including 8 semesters *[Exh. 3.1: Student's handbook]*. **Figure 3.1** shows the percentage of basic courses, fundamental courses, and specialized courses. Those percentages are benchmarked with other ACET programmes as in **Table 3.4**.

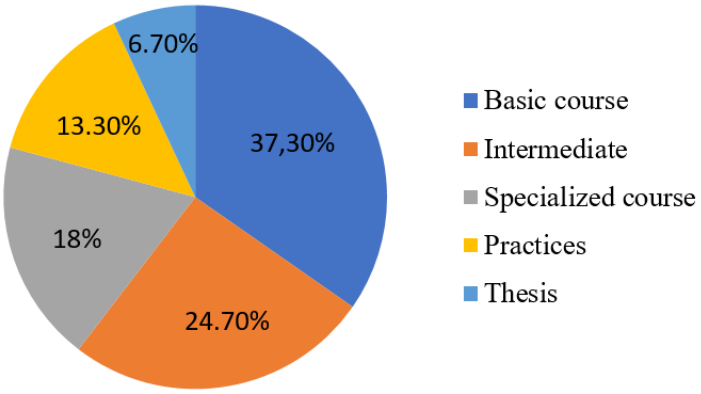


Figure 3.1: Distribution of courses in ACET curriculum (100%=150 credits)

Figure 3.1 shows balance among knowledge blocks which is including basic courses (56 credits), intermediate courses (37 credits), specialized courses (27 credits), practices and experiments (20 credits) and graduation thesis (10 credits). The curriculum has 12 elective credits and 138 required remaining credits. Students are required to achieve at least 150 credits to graduate from this programme. Compare to the curriculum before 2012 that had 189 credits in this programme many courses were integrated to eliminate overlapped contents and soft skills were integrated to all the courses in term of teaching and learning method and student assessment based on the feedback from stakeholders.

Table 3.4: The ACET programme curriculum comparisons

No.	University	No. Years	Total Credits	Basic Knowledge	Intermediate Knowledge	Specialized Knowledge
1	HCMUTE (2012)	4	150	56	57	37
2	HCMUTE (2018)	4	132	49	59	24
3	HCMUT, Vietnam	4	142	45	45	52
4	International University, Vietnam	4	141	54	45	42
5	Chulalongkorn University, Thailand	4	144	57	67	20
6	The University of Colombo, Sri Lanka	4	129	39	64	26
7	Purdue University, USA	4	120	53	43	24

The basic courses including math, physics, chemistry, political and social science help to student to gain general knowledge and skills to promote self-study and life-long learning.

The fundamental courses for such as programming, Electric circuits, Advanced math for engineers, basic Electronics, Electric Machines, etc. leverages the key resources of basic courses to achieve the core knowledge and skills that students can progress well into automation and control engineering field as well as adapt to different working environments within the electrical and electronics engineering fields.

The specialized courses such as Microprocessor, Automatic Electric Drives, Programmable Logic Controllers, Data Transmission and PLC Networks, and Projects, etc. provide students with specialized knowledge and skills in the automation and control engineering field. Finally, graduation thesis requires students to design a real system and provides them the opportunities to work as assistant engineers.

The curriculum is logically sequenced

Courses are arranged in the sequence from basic to intermediate and advanced knowledge at the end. The previous courses are required as prerequisites to enroll for the later courses. Students must study the basic course before attend the specialized courses. The basic courses are designed for 1st and 2nd semesters whereas fundamental courses for 2nd to 5th semesters. Specialized courses are taught in the 6th semester. The sequence of courses is chosen so that students will acquire the basic then fundamental knowledge and skills to be able to study the specialized courses. Students can take internships for at least 3 weeks from the 7th semester and then finish their graduation thesis in the 8th semester. The curriculum map in **Appendix 3** shows the sequences and relationship between courses for ACET programme.

The curriculum is integrated and up-to-date

ACET curriculum has been updated regularly, not only the content but also its structure. In 2012, ACET curriculum was reduced to 150 credit hours compared to 187 credit hours of 2008 4 year-curriculum. The goal of this revision is to promote self-study of students, merging the duplication knowledge courses, eliminating contents that are out-of-date trending to modern technology, adding new course such as Introduction to ACET *[Exh. 3.2: Course syllabus of Introduction to ACET]*. Several courses were integrated to avoid overlapping between courses as well as to allow for a subject matter to be taught as a whole instead of in different courses. Soft skills were also integrated into every course through the enhancement of student-centered teaching and learning activities. The reduction in a number of credit hours was also a result of benchmarking with other ACET programme. In 2018, the ACET curriculum is revised to 132 credit hours by integrating more courses and promote self-study with help of flipped classroom on HCMUTE LMS. Startup skills and entrepreneurship courses are added to help students identify entrepreneurial opportunities. Students will be also encouraged to take Massive Open Online Courses (MOOCs) which are equivalent to ACET courses and approved by the head of ACET Department *[Exh. 3.3: The decision of attending the MOOCs]*. **Table 3.5** shows the updated structure of ACET curriculum over the years.

Table 3.5: Comparison of ACET curriculums in three periods of 2008-2011, 2012-2017, and 2018-current in credits

No.	ACET Curriculum	Total Credits	General courses	Fundamental courses	Practice/ Experiment	Specialized courses	Thesis
1	2018- current	132	49	32	17	27	7
2	2012-2017	150	56	37	20	27	10
3	2008-2011	189	66	56	27	33	7

4. Criterion 4: Teaching and Learning Approach

4.1. The educational philosophy is well articulated and communicated to all stakeholders

HCMUTE is one of the oldest universities in Vietnam. The educational philosophy of HCMUTE is

"**H**umanity, **I**nnovation and **I**ntegration" which is published to students, lecturers, administrators, and other stakeholders at the university website and other media channels. The educational philosophy is also often mentioned in the meetings with lecturers, alumni, employers, and students. In addition, lecturers introduce the educational philosophy to freshmen in the "Introduction to ACET" course.

Humanity is characterized by good deeds, dedication to the community, and thoughtful thinking, self-mastery and peaceful living with others.

Innovation is concerned when designing and teaching the ACET program. Teaching methods that promote student creativity are addressed as problem solving through "Concept Formulation, Design, Implementation, and Operation".

Integration emphasizes the policy of HCMUTE such as encouraging lecturers to participate in training courses with foreign experts through HEEAP, BUILD-IT, and COMET projects, students and lecturers exchange, etc. As the result, 10 educational programmes teaching in English have been successfully started since 2017.

The FEEE, one of the largest faculties in HCMUTE, follows the educational philosophy of HCMUTE. With the slogan is "**EEE** – **E**nsuring the **E**ducation **E**nhancement", FEEE gives students the best learning environment to tackle specialized subjects, satisfying the social demands *[Exh. 4.1: FEEE's educational philosophy]*.

To support this educational philosophy, a number of teaching and learning methods have been implemented in the ACET programme to stimulate activeness, creativity and responsibility of students. By attending many training courses hosted by the HCMUTE or international corporation programs such as Higher Engineering Education Alliance Program (HEEAP), Vocational University Leadership Innovation Institute (VULII), Connecting the Mekong through Education and Training (COMET) or Build University Industry Learning and Development through Innovation and Technology (BUILD-IT) programs, lecturers obtain useful pedagogical and assessment methods necessary for quality learning based on ELOs *[Exh. 4.2: List of courses for pedagogical methods]*.

All lecturers are required to use the E/M learning system with different levels based on the content of course as well as the readiness of lecturers. For the lowest level, basic information of the course is required to upload in the E/M learning system, such as syllabus, reference documents, sample exams, lecture notes and assessment methods. For the highest level, many video clips, forum, and online assessment are created to help students self-study easier *[Exh. 4.3: Online E/M learning courses]*.

4.2. Teaching and learning activities are constructively aligned with the achievement of the expected learning outcomes

CLOs are designed by lecturers based on ELOs. Lecturers are in charge of determining the contents as well as teaching and learning methods of the courses to ensure that students can fully achieve the required CLOs. Teaching and learning methods are explicitly listed in the course syllabus and introduced to students on the first day of the course. By this way, teaching and learning activities are constructively aligned to achieve the ELOs. **Table 4.1** shows the various teaching and learning activities used in ACET programme.

From the first semester, the Introduction to ACET course introduces students the career orientation, job opportunity and roles of ACET engineers in society. Besides, this course provides students many soft skills that they will apply and enhance throughout the programme including teamwork, discussion, presentation, writing report, and writing email, etc. These teaching and learning activities help students to understand deeply, promote interest, and orientate professional passion during the learning process *[Exh. 4.4. Activities in Introduction to Automation and Control Engineering Technology course]*.

Table 4.1: Teaching and Learning activities

Strategies	Methods
Direct Instruction	Lecture, Explicit Teaching, Didactic Questions, Demonstrations, Drill & Practice.
Indirect Instruction	Problem Solving, Case Studies, Concept Formulation, Inquiry.
Experiential Learning	Simulations, Focused Imaging, Role Play, Models, Games, Experiment, Field Trip.
Interactive Instruction	Discussions, Problem Solving, Debates, Brainstorming, Peer Learning, Reflection.
Independent Study	Work Assignment, Research Projects, Computer-Aided Instruction.

Courses for general knowledge including Mathematics, General Chemistry, Politic or Social help students have a good foundation to learn professional knowledge. In addition, English courses help students be able to read major books in English, which are the main reference books in the ACET programme *[Exh. 4.5. Syllabus of general knowledge courses]*.

The fundamental and specialized knowledge that is provided to students from basic to advanced, students feel confident to join in active teaching and learning processes. In addition, discussion, presentation and project-based problem solving are often employed to improve abilities of self-study and gain professional knowledge and soft skills in specialized courses *[Exh. 4.6. Sample reports of course project]*.

Besides theoretical courses, to strengthen theoretical knowledge students must study compulsory practical courses. Practical courses are arranged in ascending order of skill levels. Students have to accumulate twenty credits of practical training during the whole period of study. All practical courses have details criteria so that the assessments will be done clearly by rubrics *[Exh. 4.7: List of practical courses]*. Students also participate in factory visits, specialized job fairs for automation and control engineering fields in Ho Chi Minh City. Through these activities, students can reflect what they have learned to what is happening in the industry. Industrial Internship is an opportunity for students to explore the real working environment at companies for at least 4 weeks. Students can seek the internship by themselves and register with lecturers. If students cannot find a suitable company for internship by themselves, lecturers will introduce students to employers. They will work in a group or individual according to the time and working regulations of the companies. After finishing their internship, the students' reports will be evaluated by supervisor at the companies. Lecturers will review and decide a final grade for students based the students' presentation and the feedbacks of their supervisors. This is a very good opportunity for students not only to actually tackle practical problems at work but also to improve their job seeking ability. Students with the excellent or good GPA can be received financial support from companies and enterprises. The survey shows many internships lead to jobs before or just right after graduation for ACET graduates *[Exh. 4.8: Reviews of employers on internship]*.

Scientific research activities of student contribute to improve their learning quality. Students are encouraged to participate in scientific research where they can study how to design, write reports, and represent the findings. In particular, each topic is assigned to a self-managed group of 2-3 students. The group leader is responsible for compiling the group work and reports to the instructor. Scientific research and graduation thesis help students supplement knowledge, analyze, evaluate, and combine with reality to solve problems. Students will have many useful experiences from scientific research such as teamwork skills, report writing, presentation skill that will support the

student's graduation thesis and students working ability after graduation *[Exh. 4.9: Student scientific research]*.

Students can also apply knowledge and skills in different courses in various student research competitions at faculty, university and national levels. Every semester, FEEE organizes some student contests such as LED Design, PLC Omron Programming sponsored by Omron, Maze Solving Robot sponsored by Cargill Company, Solar Car Racing, Automation Project-Based Learning Competition sponsored by BUILD IT project, HOLCIM Prize for students all over Vietnam, Eureka Prize by Youth Association of Ho Chi Minh City for students all over Vietnam *[Exh. 4.10: Information about student contests and specialized trade fairs]*.

Students can use FEEE labs to carry out their scientific research and they also receive financial support for the project. Students can publish their scientific research results on the scientific journals. Student research certificate is the foundation to help them in scholarship and job applications. Students can also apply knowledge and skills in different courses in various student research competitions at faculty, university and national levels. Since the foundation, FEEE has a good relationship with many companies and receives funding from them. Thus, FEEE is equipped with modern multimedia infrastructure, high-quality laboratories that support teaching, learning, and scientific research activities. FEEE has received generous contributions and valuable support from sponsors such as Rockwell Automation, Intel Vietnam, Panasonic, Siemens, Renesas, ABB, GE, etc. With a list of nearly forty laboratories, FEEE offers students the best access to advanced equipment in studying and researching *[Exh. 4.11: Information about labs of FEEE]*.

The effectiveness of the teaching and learning activities are evaluated through a number of ways such as self-assessment of lecturers at the end of each semester in lecturer portfolios, class observation and comments by colleagues, students' feedback in class and online evaluation of courses at the end of each semester *[Exh. 4.12: Feedback for teaching and learning ISO procedure]*. The evaluation result helps lecturers improve their choice of teaching and learning activities to help students learn better and motivate them to engage in class activities.

Lecturers have been continuously trained in student-centered teaching and learning methodologies with internal training as well as training by international experts. As the name HCMUTE implies, HCMUTE is eligible to provide training on teaching methodologies and awards teaching certificates, not only for university students and graduates who want to teach in vocational school and colleges but also training for pedagogy for university lecturers around the country. This training programme covers curriculum design principles, flipped classroom technique and educational technology, teaching innovation, student assessment, etc.Till now, all ACET and FEEE lecturers have finished this internal training programme. Since 2010, HCMUTE lecturers in general and ACET and FEEE lectures have enjoyed the training on teaching and learning methodology, student assessment, flipped classroom technique, quality assurance for teaching and learning, teaching leadership and soft skills for students from experts of Arizona State University (ASU) in the projects called HEEAP 1.0, HEEAP 2.0, VULLI and BUILD IT which are sponsored by Intel Vietnam and US Agency for International Development (USAID) and many other big companies to help transform engineering education in Vietnam. HCMUTE is one of the 5 top engineering universities to participate in HEEAP 1.0, HEEAP 2.0, VULLI and one of the 10 universities around Vietnam to join in BUILD-IT project. Those trainings help FEEE and ACET implement and improve its curriculum, teaching and learning activities, and student assessment continuously toward outcome-based education.

4.3. Teaching and learning activities enhance life-long learning

The teaching and learning activities of the ACET programme are designed to not only help students gain knowledge and skills to work in the automation and control engineering field but also to help students adapt to a broad working environment as well as pursue further study. The percentage of curriculum for general knowledge and skills and specific knowledge and skills is balanced to ensure ACET programme can produce balanced T-shaped engineers who can work across broad disciplines

and become experts in the automation and control engineering field. The 8 key competencies for life-long learning defined by European Reference Framework are provided for ACET students.

Some skills of life-long learning are equipped to students in the Introduction to ACET course in the first semester. Students learned about the ability to use English materials, develop presentation skills, skills for discussion, teamwork and critical thinking help students build their own study plan and career orientation. Besides, students enrich English ability emphasizing on reading and writing skills from English courses and lecture notes of specialized courses in English. Additionally, the English clubs also provide students with opportunities to communicate effectively in English *[Exh.4.13: Activities in English clubs]*.

As an engineering programme, up to 15 percentage of ACET curriculum are courses in math, physics, and chemistry. Those courses equip students with a solid background in math and natural science to allow them to study other engineering subject matters easily as well as pursue scientific research.

For information technology competency, students take a course in programming language as part of the fundamental knowledge for computer-aided designing. Students frequently use computer programmes such as office programmes and computer-aided design software in automation and control field. Students develop their computer skills through lectures and lab practices. This approach provides students with opportunities to experience the learning process similar to professional activities in future career *[Exh. 4.14: Poster of a thesis]*.

The discussion, presentation and projects in the ACET programme enhance students' professional skills and life-long learning. For example, when assigning topics for discussion, presentations or projects, lecturers always give detailed guidelines of how to find, analyze, and process information, how to write and present results. This is an effective way to teach students how to self-study *[Exh. 4.15: Guidelines for course projects]*.

To increase the awareness and attitude to the life-long learning of students, they are always encouraged to participate in the activities organized by the Youth Union/Student Association to have the active awareness and attitude to be a good citizen. Many extra-curricular activities including Blood donation program, Green summer campaign, Green Sunday, Student supports, FEEE Traditional Camping, FEEE Unions regularly organizes other activities such as visiting heroic Vietnamese mothers, lighting candles in martyrs' cemetery, participating Children Middle Autumn program, and charity program as well as organizing skill competitions, academic clubs and English communication in students. Through social activities, students feel their lives are meaningful *[Exh. 4.16: Student activities]*.

5. Criterion 5: Student Assessment

5.1. The student assessment is constructively aligned to the achievement of the expected learning outcomes

Student assessment of the ACET programme includes admission assessment (national exams, review of academic transcripts), progress assessment (mid-term and final exams), graduation assessment, attitude and ethics.

To be admitted to the ACET programme students must take the national exam under the groups such as A00 (Mathematics, Physics, and Chemistry), A01 (Mathematics, Physics, and English), D01 (Mathematics, Literature, and English), or D90 (Mathematics, English, and Natural science). National exam points are determined by the school and faculty, and must be higher than the cut-off point of MOET. Besides, FEEE also admits high school candidates with high school profiles satisfying admission conditions as announced by HCMUTE *[Exh. 5.1: Student enrollment project]*.

The ACET programme is designed based on ELOs. To achieve all ELOs, ACET student assessments are continuously performed including admission assessment, learning assessment through courses

and social activities, and a graduation thesis. In addition, first year students must take an English proficiency exam. Based on this result, HCMUTE and FEEE will organize classes appropriate for each student *[Exh. 5.2: English pre-test]*.

The results of student learning are assessed by a variety of methods such as presentations, exercises, tests, midterm exams, projects, and final exams.

Formative assessment account for 50% of the final grade for each course. Summative assessment accounts for the remaining 50%. These types of grades multiplied by corresponding proportions will be assigned in a total grade and stored by the student's cumulative system. The lecturers decide the schedule of formative assessment for each course (minimum of two assessments).

Summative assessment is approved by ISO procedure. Based on this procedure, the assessment methods and content must follow the CLOs that are listed in the syllabus and reviewed by Head of Department to ensure that the assessment is constructively aligned with the CLOs *[Exh. 5.3: ISO procedure for testing]*.

In addition, in order to diagnose the students' capability, non-marking tests such as quizzes, minute papers, and muddiest points are utilized. These diagnostic assessments are valuable feedback from students to help lecturers improve their lectures timely as well as to help the student know at what level of knowledge and skill they have achieved.

Table 5.1 presents the skills to assess relating to blocks of knowledge which are equivalent to ELOs that shown in **Table 1.2**. For example, ELO-3.2: "An ability to select various communication skills in both technical and none technical environments" belong to Generic skills that can be assessed in many courses such as Introduction to ACET, Projects, and Graduation Thesis.

Table 5.1: Some student assessment skills

No.	Blocks of knowledge	Skills to Assess
1	Basic	Presentation, Homework
2	Intermediate	Oral, Presentation
3	Specialized	Essay, Writing, Modeling
4	Practice/Experiment	Teamwork, Real model/Simulation
5	Thesis	Teamwork, Oral, Writing, Presentation, English

For internship, students will work mainly at companies for at least four weeks. Students participate in real work environment at the companies. The internship assessment is based on the rubric and the student's report that is reviewed by both supervisors in the company and the lecturers. The Internship assessment is based on the rubric and the student's report that is reviewed by both instructors in the company and lecturers *[Exh. 5.4: Internship rubric]*.

After completing all the courses in the programmes, students are supervised by lecturers on the graduation thesis. During the graduation thesis, students have to meet weekly with their supervisor to present their results. Most of the graduation thesis are based on problems that students discovered during their internships. Most ELOs are assessed through the graduation thesis using a rubric conducted by an independent reviewer and a committee of lecturers and employers in an oral defense *[Exh.5.5: Assessments of final thesis]*.

HCMUTE uses a 10.0 scale for grading the achievements of students in the courses and classifies the results of students' studies based on Grade Point Average (GPA) scale of 10.0 as shown in **Table 5.2**. *[Exh. 5.6: Regulations of the university in credit system]*.

Table 5.2: GPA for classification of students' studying results

No.	GPA	Classification
1	$8.5 \leq GPA \leq 10$	A. Excellent
2	$7.0 \leq GPA \leq 8.4$	B. Good
3	$5.5 \leq GPA \leq 6.9$	C. Average
4	$4.0 \leq GPA \leq 5.4$	D. Weak
5	$GPA < 4$	F. Too Weak

5.2. The student assessments including timelines, methods, regulations, weight distribution, rubrics, and grading are explicit and communicated to students

From 2015, HCMUTE has published a decision regulating examination evaluation which stipulates that objectives, contents, methods, plans, and exam criteria must be presented in the syllabus and posted in the LMS *[Exh. 5.7: Decision 1163/QĐ-ĐHSPKT]*.

Students' assessments including timeline, methods, regulations, weight distribution, rubrics and grading are well defined in the course syllabi, and clearly announced to students on the first day of the courses. Besides, students can read this information on student's handbook and on the website of the university at www.hcmute.edu.vn.

- **Timeline**: At the beginning of each semester, teaching plans and teaching schedules are published by all lecturers. After enrolling for classes, student studying schedules will be sent to all students. All lecturers and students will follow these plans. The Academic Inspectorate Office (AIO) will check all teaching and learning activities to ensure the implementation of these plans. At the end of the semester, the QAO will conduct student surveys about teaching and learning activities. Students' feedbacks will be analyzed and evaluated then sent to the Board of Deans. Teaching and learning will be improved based on students' feedback *[Exh. 5.8: Procedures]*.
- **Methods of assessment**: Lecturers choose the appropriate assessment methods with the content and requiring students to perform soft skills. The assessment methods in the ACET programmes are questions and answers, assignments, course projects and open questions. Lecturers will inform the assessment methods to students at the beginning of the course.
- **Regulations and Weight distribution**: A course assessment consists of two types: formative and summative assessments with weight distribution is 50% for each, which is presented in item 5.1. This information is also clearly stated in the syllabus and discussed with students in the start of the course.
- **Rubrics and Grading**: The assessment of students include course assessment, graduation thesis, internship and projects are based on criteria and rubrics *[Exh. 5.9: Course assessments]*.

The course assessment activities are to assess students' fulfillment of CLOs. The syllabi and teaching plans are defined and published on the websites of lms.hcmute.edu.vn and feee.hcmute.edu.vn, thus students are clearly informed about how the test will be evaluated, what they will be tested or evaluated, what they will achieve and what criteria are assessed *[Exh. 5.10: Online E/M learning courses]*.

For course projects and graduation thesis, the students' progress is assessed weekly by supervisors as the formative assessments. The final assessment results of the course projects are independently evaluated by other lecturers. The graduation thesis is assessed by the supervisor, an independent reviewer and a committee of at least three members. The final score of these projects is the average of the scores given by them. Rubrics are used for all these assessments based on the students' reports, drawings, designing and performances during their oral defenses.

5.3. Methods including assessment rubrics and marking schemes are used to ensure validity, reliability, and fairness of students assessment

The FEEE applies various methods for student's assessment in courses such as multiple choice questions, writing examinations, presentations, oral defense, discussion, assignment, homework, teamwork activities, quizzes, one-minute papers, etc. The examination form is approved by lecturers and Head of the department for checking the relevance between question contents and CLOs written in the syllabus. To assess knowledge and skills which expressed in syllabus and teaching portfolio, lecturers have to decide student assessment methods. During thesis and project work, students are given weekly feedbacks by supervisors. Besides, graduation thesis and project work are graded by rubrics to ensure that the assessment is reliable. Rubrics are designed and widely applied to formative and summative assessments, especially in experimental and practice courses, projects, and presentations. These rubrics are informed to students in advance by the lecturers and posted on the FEEE's website. After that answers and grades are informed to students and put on the LMS system of the university *[Exh. 5.11: Lecturer Portfolio]*.

Through student's social activities assessment system, the Admissions and Student Affairs Office will monitor closely and assess attitude, ethics, civic education of students and their social attributions.

Besides, HCMUTE's ISO procedure regulates the forms of theoretical exams, practical exams and paper exams which are posed at website qao.hcmute.edu.vn. Theoretical exam form specifies that the design of questions testing or testing content must be aligned with the CLOs. This procedure has to be strictly followed by lecturers to guarantee fairness of student's assessment. Additionally, marking schemes explicitly listed in the final questions and answers, and assessment rubrics are means of grading to ensure reliability and fairness of student's assessment among lecturers *[Exh. 5.12: Marking schemes in writing examination and answers]*.

Depending on the characteristics of courses and assessment criteria, lecturers will use appropriate assessment methods. The project-based learning method is applied to Project 1, Project 2, Project 3 and graduation thesis so that there are many assessment methods used for these courses. For example, assessment methods for presentation, team project, and essay are applied for SCADA, Robotics and Robotic in Practice courses. To ensure the assessment is reliable, rubrics are designed and widely applied to formative and summative assessments, especially in experimental and practice courses, projects, and presentations. These rubrics are informed to students in advance by the lecturers or on the FEEE's website. Other courses usually have assessment methods for quizzes, homework, and writing reports.

According to ISO procedure for planning and organizing examination, the fairness and objectivity of student's assessment is ensured. For example, at least two independent proctors supervising about 30 students in each examination room; students are informed of their examination schedule two weeks in advance. Lecturers are to solve student complaints regarding exam grades within seven days after receiving student complaint form; students can view their new grades on the website *[Exh. 5.13: Procedure for planning and organizing examination]*.

Seminars and workshops are organized HCMUTE and FEEE to offer guidance and experiences sharing opportunities on designing and using assessment methods. In addition, lecturers are encouraging to participate in workshops and training courses managed by senior lecturers or specialists from HEEAP and BUILT-IT projects (formed by Intel Corporation, USAID and Arizona State University) *[Exh. 5.14: Workshops on the student's assessment]*.

The validity of formative assessment is also ensured and verified based on the surveys of students and discussions among lecturers whose teach same courses for improvement. For specialized courses, open questions are applied in the writing exams and students are allowed to use reading resource to answer the questions *[Exh. 5.15: Online survey form]*.

5.4. Feedback of student assessment is timely and helps to improve learning

To improve the learning processes of students, timely feedback is provided to students so that they can improve their learning.

- Diagnostic/Formative assessment: Entrance English testing for a freshman, testing knowledge of the student before the beginning of the course using quizzes and review questions.
- Formative assessment: Lecturers usually use short quizzes throughout the course to evaluate the students' achievement of CLOs. After each test, the answers are provided immediately on LMS if the quizzes are performed online or the answers are provided in the class.
- Summative assessment: Following the regulations of HCMUTE, the answer for questions in exams and grading scale are given to students after 3 days.
- For assessing the Internship, Projects, Practice courses and graduation thesis, rubrics are used to evaluate knowledge and skills with different levels, which will announce to all students from the beginning of the course. Especially, for practical courses, professional and skills of students are adjusted in practice. Students will realize errors and improve their skills. The assessments of practical courses are designed following the results of each skill *[Exh. 5.16: Rubrics for Practical courses]*.

Based on the results, lecturers evaluate the student's academic performance to make teaching adjustments and give suggestions for students to improve their learning and adjusting study plan. The curriculum is structured in terms of different characteristics, thus the assessment skills are diverse and scientific.

All of the grades including formative assessment and summative assessment are put on the online system by lecturers for students to access within 7 days after finishing the final exams.

5.5. Student have ready access to the appeal procedure

HCMUTE has a procedure to verify results. The lecturers post the exam answers in maximum 3 days after the exam as required by HCMUTE. In case students do not agree with their grades, they can meet to discuss with lecturers based on the assessment criteria. There is a form for students to send their questions about their grades to the faculty office. To ensure objectiveness and fairness, the re-grading process is done by another examiner who did not grade the examination. The result of re-grading process is informed to the student one week later. If the student still does not satisfy with the result, he/she can request to see the examination and discuss with the examiners in person *[Exh. 5.17: Verified results and procedure for planning and organizing examination]*.

6. Criterion 6: Academic Staff Quality

6.1. Academic staff planning (considering succession, promotion, re-deployment, termination, and retirement) is carried out to fulfill the needs for education, research, and service

FEEE develops a mid-term plan every five years according to the mid-term strategic plan of HCMUTE. FEEE's 2013-2018 Strategic Plan with vision to 2020 comprises of goals and action plans for human resource development, education programmes, quality assurance, research, and facility and infrastructure development *[Exh. 6.1: FEEE 2013-2018 Strategic Plan with a vision to 2020]*.

In particular, FEEE's Human Resource Development strategic plan details the total number of academic staff as well as the number of academic staff who would earn PhD degrees and associate professor titles for every year. This plan considers the needs of academic staff to fulfill the workload for the existing academic programmes, new programmes, and the need of FEEE to focus on research. The plan also projects the number of retiring academic staff. **Table 6.1** shows the number and qualification of academic staff planned for 2013-2018 period as well as the achievement by August 2018. The last five years have witnessed a significant increase in PhD and associate professor holders. It is the result of HCMUTE's and FEEE's policy on human resource development since 1999. The

detail policy on human resource development, rewards, and recognition would be described in Sub-criteria 6.3 and 6.8.

Table 6.1: FEEE human resource development in 2013 – 2018 period

Degree of Lecturer	2013	As planned in 2018	Now (by the end of 2018)	Percentage
Ph.D. degree lecturer	12	28	25	25.3%
Master degree lecturer	76	79	75	77.3%
Associate Professor	3	7	11	11.3%

FEEE Human Resource Development strategic plan also included an action plan for staff training in term of further study for higher degrees as well as professional knowledge and skills to enhance teaching and learning, research as well as leadership and management skills. An academic staff with master degree, if newly recruited, would be encouraged to finish his/her PhD degree in 5 years.

For enhancing leadership and management skills, FEEE has a priority for the head and deputy head of departments, dean boards to participate in the short-term courses, seminars and workshops to develop their management and leadership skills *[Exh. 6.2: The announcement to participate in the training courses and seminars]*. Academic staff with some management and leadership skills would be selected to take part in the short-term courses to develop their professional and management skills.

In term of succession planning, academic staff was recruited based on the need of a succession plan for a particular specialized, then he/she would be mentored by a senior academic staff. This is to ensure that a course has to be taught by at least 2 academic lecturers so that if unexpected thing happens such as staff illness, job quitting or a female staff has a newborn baby, the course teaching will not be affected. The succession plan for a key appointment for head/deputy head of the department, faculty board is done every five years *[Exh.6.3: Lists of English training courses, visiting courses]*.

Table 6.2: Number of retired staff and newly recruited staff

Staff	2013	2014	2015	2016	2017	2018
Number of retired staff	1	1	1	2	2	1
Number of newly recruited staff	5	2	1	1	1	1

Table 6.3: A plan to develop the faculty during the 2019 – 2023 period

Year	Ph.D. lecturer	Associate Professor	Professor
2019	2	1	-
2020	2	1	-
2021	2	2	-
2022	3	2	-
2023	3	2	1
Percentage as planned in 2023	28%	15%	1%

The 2013-2018 mid-term Strategic Plan of FEEE has expected the number of PhD lecturers is 30% of total FEEE academic staff, and the number of associate professors is 7.5%. The actual percentage of associate professors in 2018 fulfills the expectation (as shown in **Table 6.1**), however, the percentage of PhD degree lecturers is less than expected. As this Strategic Plan, the number of retired staff and newly recruited staff of FEEE have balanced as shown in **Table 6.2**. Therefore, the mid-term Strategic Plan for period 2019-2023 is currently under revision and is expected to be issued by early 2019. **Table 6.3** shows the academic staff planning for the next 5 years. It is expected that the number of PhD holders and associate professor titles will increase because there are 13 lecturers currently enrolled in PhD programmes abroad and 5 lecturers in Vietnam.FEEE creates favourable conditions for excellent FEEE graduates and lecturers with master's degree to enter the PhD

programme. These conditions are to develop future academic staff. Excellent graduates can enter the masters programme without taking an entrance examination and academic staffs taking the PhD programme are exempted from teaching workload.

6.2. Staff-to-student ratio and workload are measured and monitored to improve the quality of education, research, and service

The ACET curriculum is designed to produce balanced T-shape graduates, up to 33.3 percent of the programmes are taught by other FEEE departments and 35.3 percent for math, physics, and English taught by other none-FEEE departments. At present, the academic staff of Department of Automatic Control devotes 10% of its teaching load to teach for other programmes within FEEE.

Table 6.4 shows the number of academic staff and the Full-Time Equivalent (FTE), where the FTE coefficient of a full-time non-ACET lecturer is 0.35 and the FTE coefficient of a visiting professor/lecturer is 0.7.

Table 6.4: Number of academic staff and the FTE of the year 2017-2018

Category	Male	Female	Total		Percentage of PhDs
			Headcounts	FTEs	
Associate Professors	4	0	4	4×1=4	100
Full-time ACET Lecturers	18	2	20	20×1=20	35
Full-time Non-ACET Lecturers	26	12	38	38×0.35=13.3	18.4
Visiting Professors/ Lecturers	17	0	17	17×0.7=11.9	35.3
Total	**65**	**14**	**79**	**49.2**	

The staff-to-student ratio is shown in **Table 6.5**. As MOET requires the staff-to-student ratio about 1/20, the staff-to-student ratio of FEEE is close to the MOET requirement.

Table 6.5: Staff-to-student ratio

Academic year	Total FTEs of academic staff	Total FTEs of students	Staff-to-student ratio
2017-2018	49.2	1056	1/21.5
2016-2017	51.45	1164	1/22.6
2015-2016	48.65	1148	1/23.6
2014-2015	50.75	1189	1/23.4
2013-2014	50.1	1219	1/24.3

As a public university, HCMUTE's academic staff has to fulfil the workload policy regulated by MOET. HCMUTE has developed it workload policy based on MOET requirement as shown in **Table 6.5**. For research and service workload, HCMUTE has issued a detail guideline to convert the research outputs (publication, project, and technology transfer) and services to equivalent workload. For example, a SCI publication would be equal to 800 hours of research workload.

Workload of academic staff is monitored annually with support by a Key Performance Index (KPI) system. At the beginning of a semester, each staff creates his/her own target on "Teaching", "Research", and "Service" hour based on the yearly standard hour of academic staff as shown in **Table 6.6**. Departments and faculty are responsible for evaluating the results at the end of each semester based on his/her performances and evidences *[Exh. 6.4: HCMUTE and MOET workload regulations]*.

Table 6.6: A yearly standard hour of academic staff

Title	Standard hour for academic staff			Total
	Teaching	Research	Service	
Professors	270	240	20	530
Associate professors	270	210	30	510
PhD degree lecturers	270	195	60	525
Senior lecturers, Master degree lecturers	270	189	70	529
Lecturers, Master degree lecturers	270	177	80	527
Probationary lecturers	270	75	180	525
Physical lecturers	270	-	400	670

Before starting a semester, there is a meeting in the department to distribute the teaching of courses for all the academic staff of the department; therefore, all the academic staff are satisfied with the teaching workloads. To encourage research, HCMUTE allows academic staff to choose workload schemes where he/she can do more research and less teaching. For example, an associate professor can choose a workload of 380 research equivalent hours and 100 teaching hours only instead of 210 research equivalent hours and 270 teaching hours. During the semester, all academic staffs can discuss with the head of the department if any problem occurs *[Exh. 6.5: Meetings of department]*. Academic staff satisfaction with the working environment is collected via surveys *[Exh. 6.6: Working load survey and report]*. Academic staff can also voice their feedback at faculty meeting as well as meeting at university levels.

6.3. Recruitment and selection criteria including ethics and academic freedom for appointment, deployment, and promotion are determined and communicated

The ISO recruitment procedure at HCMUTE has been developed based on the regulation from Vietnam Ministry of Internal Affairs and HCMUTE criteria, regularly updated and uploaded on the website of QAO at http://qao.hcmute.edu.vn. HCMUTE, as well as FEEE priority, is to recruit people with PhD degrees from English-speaking countries or PhD holders with good English competence *[Exh. 6.7: Lecturer recruitment policy]*.

All the recruitment criteria and procedures have been announced on the university website and on the newspapers as required by Ministry of Internal Affairs. FEEE recruits academic staffs who have abilities that meet the requirements of the departments, especially the requirement in subject specialization and research porfolio and also meets the academic staff criteria of the government. In particular, the recruited academic staff must have the appropriate qualification in the required subject areas needed, IT competences, teaching skills which are assessed through a mock teaching to an assessor panel, as well as good English competence. They must also have teaching experiences and the other specific aptitudes that required by the departments. The applications would be assessed by a panel comprising of the head of department and the dean boards then only potential candidates will be called upon for an interview with the head of departments and the dean board. He/she is also required to prepare the teaching plan for a class period and perform the teaching panel. Good candidates are then selected to have an interview in English with HCMUTE President and the Dean.

A senior academic staff would be appointed to mentor a newly recruited academic staff. The probation period for newly recruited academic staff is one year. If he/she is qualified with good evaluation result from the mentor, acquires the teaching certificate for higher education then he/she would be suggested to continue the contract with HCMUTE for 1 year to 3 years as a lecturer. After this second contract, if he/she is qualified then he/she would be suggested by the head of the department to sign a permanent contract with HCMUTE.

HCMUTE has clear promotion criteria and processes for an academic staff promotion. Academic staff could be promoted in academic rank and management position. In term of academic ranks, there are assistant lecturer, lecturer, senior lecturer, associate professor, full professor positions. Those

criteria are based on regulation from MOET. For example, to be promoted to a senior lecturer rank, an academic staff has to hold the lecturer rank for at least 6 years for a PhD holders or 9 years for a master degree holders and meets the requirement of textbook/teaching material and research publication. He/she then has to pass an examination held by MOET before he/she could be promoted by HCMUTE president. The promotion of a lecturer with a PhD degree to the rank of Associate Professor/Full Professor strictly follows the standards of The State Council for Professor Title of Vietnam. An academic staff will have his levels within his academic rank increased after every 3 years if he/she fulfill his/her duty. An academic staff can have his level increased after just 2 years if he/she performs well. When an academic staff has an academic rank promotion or increase in levels, his/her salary would be increase accordingly *[Exh. 6.8: Lecturer promotion policy]*.

For management positions, academic staff can be promoted to head/deputy head of department or dean/vice dean of faculty, director/deputy directors of offices such as Academic Affairs Office, Research Management Offices up to vice presidents and president.

All the duties allocated to academic staff are appropriate with qualifications, experience and aptitude. There are several criteria for different positions. For management criterion, the head of the department must have a PhD degree and have been working in that field with good practical experiences. For teaching distribution criterion, each academic staff are encouraged to teach two different courses and each course can be taught by at least two different academic staffs. The practical/experiment courses are distributed to the experienced academic staffs with high technical skills level. Only high-quality academic staff supervise the graduation thesis or research of students. The academic staffs, who have a strong relationship with companies are assigned to guide the student on-site visit and internships. The other service activities are delivered based on the aptitude and experience of academic staffs.
Each academic staff clearly understand the responsibility and the relationship with the head of department or colleague as they are clearly described in the contract and the Lecturer Working Regulation. All academic staffs are accountable to the university and the FEEE for their lecture contents. They can freely choose any teaching methods and assessment methods aligning with ELOs and which are approved by the head of department. They are also accountable for the professional ethics in scientific research, copyright, intellectual property and other relevant laws *[Exh. 6.9: Assessment Method Regulations and Lecturer Professional Ethics]*.

6.4. Competencies of academic staff are identified and evaluated

Academic staff must possess high competences in scientific research, pedagogy, professional knowledge, information technology, teaching instructional design, class management, and English. As described in sub-criterion 6.2, competences in research, pedagogy, IT, English of newly recruited academic staff are evaluated during the recruitment process. During one year working as an assistant lecturer, these competencies are trained and improved, and evaluated. A qualified assistant lecturer after one year can sign an official contract as lecturer. All the criteria in teaching, scientific research as well as services are clearly shown in the contract and HCMUTE workload regulation.

Competences in research of academic staff are evaluated in term of the number of publications, funded projects he/she could win. Each research output is converted to research equivalent hours with a detail guideline in HCMUTE workload regulation

Competences in pedagogy, professional knowledge, instructional design, IT and class management skill are evaluated by students at the end of each course and the implementation of flipped classroom through HCMUTE LMS. Those competences are also evaluated by peer class observation and the head of department.

HCMUTE has a KPI system to evaluate and track the performance of staff every year (http://kpis.hcmute.edu.vn). With this KPI system, all the activities of FEEE staff including teaching, research, and service are evaluated *[Exh. 6.10: Lecturer KPI system and student surveys]*.

6.5. Training and developmental needs of academic staff are identified and activities are implemented to fulfill them

There is an ISO procedure to identify the training needs and implement the training *[Exh. 6.11: Process of HR development]*. The training and development for academic staff follows the strategic plan of HCMUTE and FEEE and it is planned in detail in the annual Objectives and Plan to execute The Objectives of the university and the faculty *[Exh. 6.12: FEEE Annual Objectives and Plan]*.

Annually, Human Resource Management Office requests each faculty and offices to submit their training needs and plan. At the faculty level, the training needs are collected from the request and suggestion for training of academic staff. This plan also includes the timeline for each academic staff to finish his/her Ph.D degrees. At university level, training for English, innovative teaching and learning, student assessment, project-based learning, IT, quality assurance etc. are provided.

For research, academic staff can be funded to attend national and international conferences if they have research papers to be published in the conference proceedings. In the past few years, FEEE academic staff also enjoyed the international conferences in electrical and electronics, automation fields held at HCMUTE as described in sub-criterion 6.7.

HCMUTE has a very good policy for human resource development, especially training and development for academic staff, such as:

- Academic staff enrolled in Ph.D programme in Vietnam would be exempted of all workload with full salary and benefit for 3 years and their tuition fee will be fully supported by the university. In addition, academic staff enrolled in fulltime study programme (Masters or Ph.D) abroad would receive additional support in terms of air tickets if not covered by the scholarships.
- Academic staff will get a bonus of about 1.500USD if he/she completes the Ph.D programme. This is also applied for newly recruited Ph.D holders. Female academic staff would get 150 percent more than her male counterparts.
- Significant cost has been spent to send academic staff to the Philippines (University of the Visayas, DLSU) to study English for 4 - 6 weeks. This training provides academic staff with better confidence in using English and has helped them win scholarship to study abroad *[Exh. 6.13: The training courses of English from 2013 to 2017]*.
- Academic staff with IELTS (6.0 or above) and equivalent English certificates would be given bonus.
- Currently there are 5 fulltime native English speakers to teach English for students and academic staff.

This policy has brought a fruitful result for Automatic Control Department of with 06 lecturers finishing their Ph.D. degrees abroad in the last five years.

A good relationship with Consulate General of India in Ho Chi Minh City has led to more than 50 scholarships from 2011 till now for academic staff to attend short course training in India, among them 04 ACET members. The other training for academic staff include in-house Pedagogy certificates, flipped classrooms, leadership and management for managers, Summer TOEFL and IELTS English Course in 2013, training course in Computer Vision in Korea 2015, training course in digital learning in Thailand 2015, training course in Technological Teaching skills 2016, training course in Power Electronics in Korea 2016, etc. *[Exh. 6.14: The visiting courses in India, Taiwan, Korean, and others from 2013 to 2017]*.

A good reputation in engineering education has earned HCMUTE as one of the five engineering universities to join HEEAP (2010-2016), VULLI (2013-2014) projects and later one of the 10 universities to join BUILD-IT (2017-2021) projects. Those are projects sponsored by Intel Products Vietnam, USAID, and other corporations, delivered by Arizona State University (ASU), to transform engineering education in Vietnam. 43 HCMUTE academic staff (among them 04 of ACET members) have been trained at ASU for 6 weeks in innovative teaching and learning, quality assurance, leadership, curriculum development, project-based learning and flipped classroom, and many other

training in Vietnam *[Exh. 6.15: HCMUTE Lecturers in HEEAP Program]*. The training from those projects has helped HCMUTE and FEEE to transform its curriculum, teaching and learning, student assessment and quality assurance and the advanced deployment of flipped classrooms at HCMUTE and FEEE (especially teaching soft skills, student-centered teaching, and learning), student assessment and quality assurance and the advanced deployment of flipped classrooms at HCMUTE and FEEE.

As flipped classrooms and project-based learning are given priority, many training for academic staff on those topics have been done by experts from ASU within BUILD-IT projects.

6.6. Performance management including rewards and recognition is implemented to motivate and support education, research, and service

At HCMUTE, there is a performance management system for each individual and each university unit, and a performance-based rewards/recognition system. Data for these systems are collected and input into the KPI online software to evaluate the performance of academic staff. This performance includes Teaching, Research, and Service activities with many specific criteria. For example, in teaching performance, the criteria include standard teaching hours, teaching quality evaluated by students, teaching portfolio preparation, textbook and teaching materials update, assessment method innovation, teaching in English, etc. For the Research performance, each research output is converted to equivalent research hours. Research outputs include journal publications, research project, student research activity supervising, technology transfer, etc. The performance result is classified as A, B, C, D, E, and F grade, corresponding to 15% and 5% increase, 0%, 5%, 15%, and 100% decrease in bonus respectively. This performance evaluation result is also used to consider the promotion of level and salary or certificate of merit at the university/ministry/prime minister level.

Apart from the monthly bonus salary rewarded based on KPI results, academic staff can get bonus with research publications. For example, an SCI ranking journal paper can be rewarded 35 million Vietnamese Dong. Staff who completes their Ph.D course (or new recruited Ph.D. lecturer) can be rewarded 20 million Vietnamese Dong. Staff who achieves "The Best HCMUTE Academic Staff of the Year" prize is rewarded an iPad Mini. Staff who achieves the certificate of merit at the university level can be promoted in level and has salary increased after two years instead of three.
To promote the use of LMS and flipped classrooms, HCMUTE rewards individual who achieves advanced level in LMS designed and flipped classrooms implementation. FEEE has also been rewarded for having the highest percentage of academic staff achieving the advanced level in LMS designed and flipped classrooms implementation.

6.7. The types and quantity of research activities by academic staff are established, monitored and benchmarked for improvement

The main research activities of FEEE and ACET programme lecturers include submitting scientific research papers and doing scientific research projects. All of these projects are monitored by the Science and Technology Office and a FEEE Vice Dean in charge of Scientific Research.

Table 6.7: FEEE scientific research statistics

Scientific Research	2014	2015	2016	2017
Number of projects	37	41	38	25
Number of papers	75	64	81	78

To increase the research activities in the future, FEEE has a policy to recruit the qualified PhD academic staff and increase funding for key research projects to produce more publication papers. FEEE also creates a good environment for academic staff with Master degree to enter the PhD study such as minimizing their workloads; prioritizing funding for their key reserch projects.

To minitor the scientific research activities, HCMUTE has an ISO procedure for research projects at university or ministry level *[Exh.6.16: ISO procedure for scientific research]*. The project expense is

based on the level of that project and the professional journal paper derived from the project *[Exh.6.17: Funding for project support]*. The project content should be aligned with the vision and mission of the faculty and university. The other research activities include the seminars, conferences at faculty/university/international level. Many international conferences in the fields of electrical and electronics engineering and control have been co-organized by HCMUTE and international partners. Those are International Conference on Green Energy and Sustainable Development, International Conference on Systems Science and Engineering (IEEE series), International Engineering and Technology Education Conference, Vietnam-Korea Joint Workshop of Solid-State Circuits and Systems, etc.

Thanks to the HCMUTE policy *[Exh.6.18: Scientific research policy]*, the scientific research of FEEE has grown recently. The total paper publications shown in **Table 6.8** makes FEEE become one of the top faculties in journal publication in HCMUTE *[Exh.6.19: Statistics of publication papers]*. HCMUTE also rewards staff for journal/conference publications and excellent projects following the university regulations *[Exh.6.20: Paper publication reward policy]*.

Table 6.8: Types and number of research publications

Academic year	Types of publication		Total	No. of publications per academic staff
	National	International		
2012-2013	14	25	39	1
2013-2014	24	34	58	1.3
2014-2015	26	49	75	1.6
2015-2016	22	42	64	1.4
2016-2017	26	55	81	1.6
2017-2018	25	53	78	1.5

7. Criterion 7: Support Staff Quality

7.1. Support staff planning (at the library, laboratory, IT facility and student services) is carried out to fulfil the needs for education, research and service

HCMUTE builds a mid-term plan every five years based on the objectives. In that plan, the human resources planning of support staff is based on the number of support staff, foreign language improvement, efficiency improvement management, the coordination of organizational units. From 2013, the Public Relations Office was divided into the Student Services Center (SSC) and the Enterprises Relations Office (ERO). At that time, the number of staff is only 8, but now it increases to 14 to serve students better.

The career development for support staff is from an Expert level to a Senior Expert level, then to a High-ranking Expert level. The career development of support staff depends on their competence, transferable skills, experiences, and the attitude that they show during the working time. To be promoted to a higher level, the support staff also need to achieve the high evaluation from academic staff and students.

FEEE has many support staff to manage laboratories. There are 31 laboratories in FEEE and they are always available for students to study or work on their final theses *[Exh. 7.1: List of laboratory]*. The Automatic Control Department has 10 its own laboratories for ACET programme. The other 8 laboratories of FEEE are also served for ACET programme. Each laboratory of FEEE has its own manager for device maintenance and management. To ensure the staff quality, FEEE often sends staff to the short-term courses/seminars to develop their technical and professional skills.

Table 7.1: Number of support staff (August 2018)

No.	Support staff	Highest Educational Attainment				Total
		High School	Bachelor	Master	Doctor	
1	Library	2	9	2		13
2	Laboratory Personnel			33	4	37
3	Information and Network Center	3	2	2		7
4	Student Services Center		6	2		8
5	General Administration and Personnel Office	2	10	4	1	17
6	International Relations Office		1	1	2	4
7	Academic Affairs Office		8	3	2	13
8	Science and Technology Office		3	1	2	6
9	Enterprises Relations Office		5	1		6
10	Youth and Student Associations	12			1	13
11	Admissions and Student Affairs Office		7	3	1	11
12	Digital Learning Center		1	2		3
Total		**19**	**52**	**54**	**13**	**138**

7.2. Recruitment and selection criteria for appointment, deployment and promotion are determined and communicated

The selection criteria for support staff include professional competence, experiences, English and IT skills. The recruitment and selection criteria are widely published on HCMUTE website and the popular newspapers. HCMUTE has a very detailed ISO recruitment procedure, which can be found at the website of QAO.

Firstly, HCMUTE checks the job applications. Secondly, the applicant is then interviewed by the faculty board and department head. Finally, the university president will interview the applicant. The recruited staff is assigned to work based on the job description and by direction of the dean of faculty or the head of department. This new recruited staff also has his own supervisor during the one-year probationary period. After this one year, if all the recruitment and selection criteria as well as the requirements of that staff are fulfilled, the official contract is signed. The promotion in salary for staff is every three years time and it is publicly announced.

The selection criteria for promotion of dean/vice dean of faculty is described in detail in the *[Exh. 7.2: Criteria for the promotion of faculty board]*. The planning for manager appointment of HCMUTE is shown in *[Exh. 7.3: Planning for manager appointment of HCMUTE]*. All the appointee from the planning are qualified following the Higher Education Law and the university rule as *[Exh. 7.4: Qualified appointee following the Higher Education Law and the university rule]*.

7.3. Competencies of support staff are identified and evaluated

Most support staffs possessing bachelor degrees are suitable for their jobs. They have to pass the recruitment interview at the faculty level and university level. The competency that the support staff are described in details in the job description for each position. Generally, these competencies are document editing skill, plan making skill, IT and schedule management skill, and foreign language

skill. These competencies are checked during the recruitment process and strengthened during the probationary period. After a probationary period, they are considered for official employment. Every year, the dean of faculty has to evaluate the competency of staff. The student and academic staff also evaluate the services of the other university units. This shows that the support staff members are competent and qualified for their jobs.

The competencies and expertise of the support staff are adequate due to the satisfaction of students in the survey results. All the support staff also satisfy their works and they are quite willing to work for a long-term. To enhance the quality of support staff, HCMUTE often organizes the short-term courses for the functional offices and the quality of support is always considered through the feedbacks from students *[Exh. 7.5: Short-term courses and supporting feedbacks]*.

7.4. Training and developmental needs of support staff are identified and activities are implemented to fulfil them

FEEE is responsible for its support staff training and development activities. The training and development of support staff follow the strategic plan of HCMUTE and FEEE. This training includes professional training such as Information Technology skill, English skill, and short-term professional training courses. The laboratory manager also can develop their technical/professional skills through several seminars organized by FEEE. Some recent seminars for laboratory manager are "ETAP Software Training", "ABB Switch/Relay Device Training" *[Exh. 7.6: FEEE training seminars for laboratory manager]*. FEEE has applied the human resource training and development and the staff recruitment following ISO process. The support staff training and development courses are often organized by the Office of General Administration and Personnel in various areas *[Exh. 7.7: Course lists]*. The course plans, decisions, results, certificates of these courses are shown in *[Exh. 7.8: Course plans, decisions, results, certificates, course contents, and suggestions]*. The expense of these courses is supported by HCMUTE every year as shown in financial report of the university *[Exh. 7.9: Financial report]*.

7.5. Performance management including rewards and recognition is implemented to motivate and support education, research, and service

The performance management system for a support staff is similar to that of an academic staff. The rewards/recognition system also bases on the performance of staff and the data for these systems are collected from the KPI software of support staff. This KPI evaluation of support staff includes workload and efficiency, work quality, and other activities with many specific criteria. After the KPI evaluation, the performance result is classified as A, B, C, D, E, F grade corresponding to 15% and 5% increase, 0%, 5%, 15%, 100% decrease in bonus respectively. These performance evaluation results are also used to consider the promotion at salary or certificate of merit at the university/ministry/prime minister level. The performance management and rewards/recognition policy are applied for all the staff of university, therefore the rewards/recognition for the excellent performances of support staff are exactly the same with that of academic staff as described above, such as the reward for SCI ranking journal paper, the reward for staff who graduates their Ph.D course (or new recruited Ph.D. staff), the reward for staff who achieves "The Best HCMUTE Support Staff of the Year" prize, or early promotion at salary if the staff achieves the certificate of merit at the university level *[Exh. 7.10: Rewards of HCMUTE president, MOET, other organizations and lists of levels A, B]*.

8. Criterion 8: Student Quality and Support

8.1. The student intake policy and admission criteria are defined, communicated, published, and up-to-date

The student intake policy of HCMUTE is clearly defined as follows. The students from the high schools for the gifted or specialized high schools, or students who achieve national excellent student prize can get direct admission without an entrance exam. The students who has an international

English certificate are given priority for admission. The students getting top entrance exam score receive scholarships equivalent to one year and half of tuition fee. The female students are entitled to reduced tuition fee, or given priority for dormitory registration. There is a score bonus policy following the MOET regulation for the students in remote areas of the country as well as the ethnic minority students. The admission method of HCMUTE and ACET is the selection according to the Study Records or the score of the national high school graduation exam.

Usually, Dean of FEEE and Head of ACD are members of the recruitment board who have a lot of knowledge and experience to answer questions from students about the ACET programme and those related to future job and graduation. Members of the recruitment board will go to high schools to meet the high school students or invite candidates to visit HCMUTE and FEEE to present the policies, the programme quality and the engineering field orientations. FEEE also has an Open Day so that high school students can visit and explore FEEE.

Presently, the ACET programme accepts two options in recruiting high school students, one is based on Grade Point Average (GPA) and another is based on high school profile.

- **Option 1**: This option accepts GPA of the national high school graduation examination. Accepted students must satisfy GPA in regulations of ACET programme in recruiting. In addition, a number of accepted students based on GPA will be changed and issued yearly.
- **Option 2**: This option is based on the student's high school transcripts. The total scores of three subjects in each group A00, A01, D01 or D90 is the most important criterion in recruiting for high school students for this option *[Exh. 8.1: Recruitment decisions and announcement]*.

High school students are able to apply for ACET using their HSC examination result with different groups such as A00, A01, D01, and D90 as shown in **Table 8.1**.

Table 8.1: Groups for the entrance recruitment of the ACET programme

No.	Group of subjects	Subject 1	Subject 2	Subject 3
1	A00	Mathematics	Physics	Chemistry
2	A01	Mathematics	Physics	English
3	D01	Mathematics	Literature	English
4	D90	Mathematics	English	Natural science

The student intake policy and the admission criteria are widely announced to students, parents on websites, MOET handbook, newspapers, leaflets that are sent to high schools, Open Day in HCMUTE etc. On that Open Day, high school students from many high schools in Ho Chi Minh City and other neighbor cities/provinces visit to explore infrastructure, academic programme, policies, tuition and scholarship policy *[Exh. 8.2: Advisory pictures for recruitment]*. To spread fully recruiting information to many high school students, especially for key regions in the recruiting program, HCMUTE, FEEE and ACD have many admissions consulting services such as UTE-TV channel (http://utetv.hcmute.edu.vn), official admission websites (http://tuyensinh.hcmute.edu.vn, https://www.facebook.com/tuyensinhspkttphcm), admissions consulting day organized by many different newspapers, consulting at high schools, establishing high school S.T.E.M (Science, Technology, Engineering, and Mathematics) clubs to motivate students to study engineering.

Recent years, HCMUTE's President has usually organized meetings with high school students at their region directly, and called "Consulting Coffee". At these meetings, the President spent all time to answer all questions from high school students. Especially, in this year, President usually organizes the recruitment consulting at nighttime via UTE-TV Channel at http://utetv.hcmute.edu.vn called "Midnight Talk". The reason to do this is due to most of the high school students are so busy for their studying in the daytime, they are just free after around 21:00 every day so that it is a suitable time in order to talk to them. On this occasion, the President listens to their questions and consulates to them. This work also distributes to attract good students from many high schools in various regions enrolling to HCMUTE.

8.2. The methods and criteria for the selection of students are determined and evaluated

Table 8.2: Summary of the intake of first-year students

Academic year	Applicants		
	No. Applied	No. Offered	No. Admitted/Enrolled
2017-2018	1268	252	240
2016-2017	1192	215	192
2015-2016	1365	356	338
2014-2015	1228	258	245
2013-2014	1772	316	292

Table 8.3: Summary of the total number of students enrolled in the ACET programme

Academic year	Students					Total
	1st Year	2nd Year	3rd Year	4th Year	>4th Year	
2017-2018	240	170	298	184	164	1056
2016-2017	192	300	190	202	280	1164
2015-2016	338	196	204	136	274	1148
2014-2015	245	282	194	205	263	1189
2013-2014	292	216	244	208	259	1219

Annually, ACET programme is to recruit around 260 students, as shown in **Table 8.2**. There are several ways for high school students submitting their recruitment documents to ACET programme such as post office, through HCMUTE's website, and directly to the ASAO. The recruitment methods are the direct admission and the selection from the top highest scores of the national high school graduation exam. The direct admission is just a few percent of total admission quota. As the MOET regulations, students who achieve national/international excellent student prize or win the national/international science and technology competition can get a direct admission. Based on the MOET regulations, HCMUTE offers more direct admission criteria to a student who (1) graduates from the high schools for the gifted or specialized high schools with a good Study Records; or (2) gets the minimum 5.5 grade IELTS (or equivalent) English international certificate with a good Study Records and that student applies for the programs teaching fully in English. Generally, the recruitment method is the selection from the top highest scores of the national high school graduation exam.

In recent years, the quality of the ACET program recruitment is excellent as its admission score is always in the top five of this university as shown in **Table 8.4**. In addition, the positive feedback from companies for students who graduated from HCMUTE also distributes to enhance the HCMUTE's reputation in society.

In fact, the quality of graduate students relates to the quality of enrollment. It means that good recruit students have many advantages in the training process. Therefore, policies for enrollment, the consultant system and the programme dissemination are very important for the selection of students. In order to attract good students from high schools, besides doing well media work, HCMUTE also focuses on enhancing academic quality, investing laboratories with new and modern equipment, building new classrooms and good connecting with companies to ensure all of the students get a job after graduation *[Exh. 8.3: Policy decision and the ACET]*.

Table 8.4: Top five highest admission score programs of HCMUTE

2018		2017		2016	
Programme	**Score**	**Programme**	**Score**	**Programme**	**Score**
Information Technology	21.8	Automotive Engineering Technology	25.5	ACET	23
Automotive Engineering Technology	21.6	Mechatronics Engineering Technology	25.25	Electrical and Electronics Engineering Technology	23
Logistics	21.5	ACET	25	Automotive Engineering Technology	23
Mechatronics Engineering Technology	21.4	Electrical and Electronics Engineering Technology	25	Food Technology	22.75
ACET	21.25	Chemical Engineering Technology	25	Information Technology	22.5

Table 8.5 presents the results for the recruitment of ACET programme using the current methods until now. The score to enroll in ACET programme is always high during the last five year to make sure the quality of the enrolled students.

Table 8.5: Comparison admission grade of the ACET programme between different institutes

University	Admission grade					
	2013	**2014**	**2015**	**2016**	**2017**	**2018**
HCMUTE	20.5	21	23.4	23	25	21.25
Ho Chi Minh City University of Technology	22.5	21.5	24.75	24.25	26.5	21.5
Da Nang University of Technology	20	20.5	23.75	23.5	25	21.5
Ho Chi Minh City University of Transport	15.5	17.5	20.9	20	22.25	19.1
University of Transport and Communications	15.5	17.5	20.9	20	22	19.2

The recruitment method is evaluated by a survey to understand how students know HCMUTE. As a result, most of the students know HCMUTE via newspapers, Facebook, and introduction of former successful students. Therefore, the university strengthens the outreach programs toward the high school students, the Facebook online consulting, and UTE-TV channel. HCMUTE also analyzes the recruitment data filtered by area and specialty to step up the consulting programs as well as to introduce the Dashboard recruitment software in these areas. After analyzing the learning capacity of students, HCMUTE expands the group of subjects for the entrance recruitment focusing on Mathematics and English capacity because with these capacities, students can develop their career and long-life learning after graduation.

8.3. There is an adequate monitoring system for student progress, academic performance, and workload

The student progress, performance, and workload are monitored by the Academic Affairs Office, the Admissions and Student Affairs Office, and FEEE. The earned credits and grade points of students are stored by a software that students can check anytime. Every semester, students with a high GPA are awarded scholarships, and students with a low GPA are warned. With these low GPA students, the Consultants check and give advice for the next registration of courses. The students with difficult

circumstances could also get financial supports or part-time jobs. Furthermore, there are some tutoring classes for the first year students who need more help with their studying.

Lecturers can get on the website at http://online.hcmute.edu.vn to download the list of students, to manage the class, upload mid-term and final scores. For students, they can get on this website to register subjects, obtain table time and schedule for exams, and read announcements from the university. In addition, students can also monitor their own study through statistical tools on the website (average scores across semesters, mid-term grade and final grade of each subject, cumulative grade, academic alerts, etc.). HCMUTE has invested an academic alert system for the Admissions and Student Affairs *[Exh. 8.4: Online learning-teaching information and dashboard]*.

At the end of each semester, this system will filter the scores to compile a list of students who are in the warning status for their study results, these lists will then send to faculties. From 2014-2015, the AAO has deployed the Dashboard system to monitor the entire data system which is related to students' situation and results in the whole school. In addition, the Board of class, YU and SA will monitor students in complaining of school's rules and regulations, ethics, civic qualities, participating activities about social-political, cultural-entertainment, sports, participating extracurricular activities and community service *[Exh. 8.5: Studying warnings]*.

In order to monitor effectively for student progress and performance, HCMUTE uses the indicators such as score, academic ranking, training points, and the number of days of social work must be accumulated.

Currently, the training programme is 150 credits per 8 semesters. On average, students take around 18 to 22 credits for each semester, they usually focus on graduation thesis in the final semester with 10 credits *[Exh. 8.6: Thesis report and rubrics]*.

In each semester, students have informed the points of all courses, both of the formative and summative assessments, in which students with the high GPA are considered to supply scholarships for next semester. Besides, students with low GPA are supported by the department and the FEEE for example; the students are consulted to reduce the number of credits in the next semester.

However, for different reasons, the percentage of students who cannot complete the ACET programme on time is still rather high. For example, some students have difficult family situations, difficulty to catch up the curriculum with the university level in the first semesters, wrong orientations to follow this programme and other reasons. In all of these cases, the students often complete their all courses with some semesters later than the designed schedule. For helping students complete the programme on time, the FEEE/University always considers case by case to advise and support them the best way to overcome such as given scholarship for students who have difficulty in living, free support and introduce part-time jobs to students, etc. *[Exh. 8.7: Scholarship from alumni]*.

8.4. Academic advice, co-curricular activities, student competition, and other student support services are available to improve learning and employability

Before, HCMUTE primarily uses face-to-face consultation between advisors and students, however, since 2014 HCMUTE enhances counselling using the email group. Especially, heads of department who have good experience in lecturing will response all of the questions related to the ACET curriculum via email and counselling forum on the FEEE website. Moreover, other counselling activities are performed at the department, faculty, and centres including online advisors, social media system, emails, and phone calls as shown in **Table 8.6**. In order to advise effectively for students about any problems related to the courses, curriculum, facilities, study environment etc. The university and faculty always hold a face-to-face meeting every semester to discuss and solve these problems. Moreover, the team of consultants including the staff of the functional departments is also involved in supporting students.

Table 8.6: Consultant units of HCMUTE

No.	Contents consulted	Consultant units
1	Student health	HCO
2	Student life	SSC
3	Students affairs and policy	ASAO
4	ACET programme, course registration, certificates	AAO
5	Learning problems/academic	FEEE Office

Yearly, FEEE, ACD and YUSA organize a welcome ceremony for freshmen who enrolled in the ACET programme. At the ceremony, students will be introduced to the history of FEEE, ACD, and lecturers, the useful activities of the ACET programme, etc. In addition, as a friendly talk between leaders (FEEE board and head of ACD) and new students, most of the questions will be explained and answered clearly. In addition, in the welcome ceremony, ACD always organizes activities such as exhibiting of scientific research products of lecturers and students. Furthermore, new students will be shared experiences from lecturers and students in the new living environment, how to study and research in the university, what laboratories will support students, necessary soft skills, etc. New students are also introduced about the library of HCMUTE and how to use its services *[Exh. 8.8: Showing activities and training courses for new students]*.

In addition, in the begin days of the course, ACD always combines with FEEE and other correlative departments in HCMUTE to organize meetings with new students in order to disseminate regulations, policies, school health insurance, sharing experiences and orientations for new students in the study, research, life, etc. *[Exh. 8.9: First week activities of new students]*.

To support new students in English study, for first-year students who are not qualified to study a foreign language course, HCMUTE organizes language enrichment classes to help students achieve a required level of English competence to be able to enroll into English course 1 in ACET curriculum *[Exh. 8.10: English testing list]*.

Academic advisors play an important role for students such as the role of lecturer in teaching courses, the role of guider in implementation for subjects or graduation project. In addition, in research, these academic advisors will guide students in scientific research or participation in creative contests. Especially, the university usually provides funds to support students in scientific research projects. Excellent student research projects are chosen for the national scientific research competitions or prizes *[Exh. 8.11: FEEE Student Prizes]*. Annually, FEEE also organizes competitions for students such as "Maze Solving Robot", "LED Circuit Design", "F1 Racing Car", "Shooting Robot" etc. as shown in **Table 8.7** *[Exh. 8.12: FEEE Student Competitions]*.

At FEEE, each semester, students will go to visit factories such as Renesas Vietnam, Bosch, Jabil, Intel, Datalogic, etc. that can help students to update new technologies in the industry, therefore they can consolidate theories which they have learned in university. This is a good opportunity for students not only to study the practical problems but also to illustrate their capacity for finding a job in the future. Students with the excellent or good GPA can be introduced to work at the big companies and enterprises with good salary. Moreover, students will have the opportunity to participate in academic clubs, open spaces and research labs in FEEE. In addition, HCMUTE has the E/M learning system to support students in study and research *[Exh. 8.13: Job orientation and visiting trips]*.

Every semester, FEEE organizes seminars/workshops with different specialized topics such as "Collaborative Robots Working in Manufacturing" by Universal Robots company from Denmark, "Communication Bus for Power System Automation" by ABB Vietnam Co. Ltd, "OMRON Automation Devices" by Omron Industrial Automation Vietnam, "M&E in Construction" by Unicons Investment Construction Company Limited etc *[Exh. 8.14: FEEE seminars]*.

Table 8.7: FEEE student competitions

No.	Competition/Contest	Number of attended students	Sponsor
1	**Maze Solving Robot 2018** *(In this competition, the mission of the self-propelled micro mouse (robot) is to negotiate a maze from specified corner to its center in the shortest possible time)*	61	Unicons Investment Construction Company Limited (A member of Conteccons Group)
2	**Shooting Robot Contest 2018** *(The Robot uses ping pong ball to shoot falling the different size/color target within 5 minutes. The team with most falling targets will win the battle and the contest)*	35	Jabil Vietnam Ltd
3	**LED Circuit Design 2017** *(The team with the most significant LED circuit and the best design as well as most creativity will win the competition)*	92	Cargill Vietnam Ltd
4	**F1 Racing Car 2017** *(The fastest radio control F1 racing car win the game and competition)*	68	Datalogic Vietnam Limited
5	**Maze Solving Robot 2017**	69	Unicons Investment Construction Company Limited
6	**LED Circuit Design 2016**	71	Cargill Vietnam Ltd
7	**Maze Solving Robot 2016**	65	HCMUTE-VJEC
8	**LED Circuit Design 2015**	27	HCMUTE-FEEE

Currently, HCMUTE has deployed self-study areas for students on the 5th floor, the basement of the Central Building, and the faculties. Especially, the SSC will assist students in the study, part-time job, entertainment, physical activities, living skills, support and introduce jobs to students (free of charge), organize more supportive and community activities for students. The Compassion Corner of HCMUTE is also a good place to support students with difficult circumstances. This Corner provides freely some foods, books, clothes etc. by the donation from HCMUTE staff, students, or sponsors.
SSC also collaborates with other units of the university to create a learning environment and practice life skills for students, organizes student clubs to develop soft skills, supports the facilities/learning environment/extracurricular activities/social activities, and organizes the services for exchange students with other countries. Annually, HCMUTE organizes the job fair at the university campus so that to assist students in looking for jobs after graduation.

Normally, opportunities and career prospects are communicated to the students through the enrollment-counseling programme, in the introduction to ACET course, field trips to factories, enterprises, internship, and job fair. Graduates from ACET programme are working for the big companies such as Intel Products Vietnam Ltd, Bosch Vietnam Co., Ltd., Renesas Design Vietnam Co., Ltd., GE Vietnam, Datalogic Vietnam Limited, ABB Vietnam Co. Ltd, Jabil Vietnam Ltd, Omron Industrial Automation Vietnam, etc.

8.5. The physical, social and psychological environment is conductive for education and research as well as personal well-being

The infrastructure in HCMUTE consists of almost all of the necessary buildings and campuses for working, studying, research, outdoor activities, sport, etc. For example, HCMUTE is covered with many trees within a large landscape. Campus A, campus B, campus C, campus D, campus E and campus A1-A5 at the Central Building are for studying. All of the classrooms in campuses A1-A5

and half of classrooms in campus E have been equipped with air conditioners. All of the remaining classrooms in other campuses have been equipped electrical fans. The library in the basement of the Central Building with many books, computers, a reading room, many desks for students, air conditioner, full lighting, etc.

HCMUTE has a large green and clean study environment and facilities for students. There are two canteens for students, a mini supermarket, a modern canteen for lecturers and staffs. Many public rooms for students to organize group activities, teamwork, or self-study, etc. The grand hall is used for organizing many competitions and social events such as "MIC Student 2018 Competition", Meeting with US Secretary of State John Kerry, "Basketball Robot Competition", "Student Charming Contest" etc. An indoor sports house and a stadium for outdoor sports and activities are built. The 5^{th}-floor self-study area and the new advanced library are effectively served for students. Many clubs such as the music club, martial arts club, skill development club etc. are particularly useful activities for students.

Annually, YUSA organizes the sports competitions such as football, volleyball, badminton, running, etc. for students. There are many different clubs in HCMUTE so that students can join such as English club, skill club, martial art club, guitar club, dancing club, MC club, etc.

Students are supported by the HCMUTE to apply for health insurance and accident insurance through clinics. From the insurance, students are issued free medication and counselled on problems related to their health at the Health Care Center (HCC). Moreover, activities related to the health of students are that signs of warnings about gender, HIV/AIDS are appeared around studying spaces such as library rooms, public rooms, research labs, and others. The university has the programme for psycho-psychological counselling at the CSS *[Exh. 8.15: Healthy information and warning pictures]*.

9. Criterion 9: Facilities and Infrastructure

9.1. The teaching and learning facilities and equipment (lecture halls, classrooms, project rooms, etc.) are adequate and updated to support education and research

HCMUTE has two campuses. The main campus is at No. 1 Vo Van Ngan street, Linh Chieu Ward, Thu Duc district, Hochiminh City, Vietnam. The second campus is situated at 484A Le Van Viet Street, District 9, Hochiminh City, Vietnam. The total building area for studying is 144,332.5 m^2, where 114,107.5m^2 area belongs to Campus 1 and the rest of area is with Campus 2. In addition, the average area per student is around 3.95 m^2 which includes the area for both classrooms and practice rooms. Moreover, since 2007, HCMUTE has completed constructing four buildings including the Center Building, the High-Tech Building, the Multifunction Building, and the second dormitory with the total building area being 54.000 m^2.

According to the figure of 2018, HCMUTE has 189 classrooms in total with a seating capacity of each classroom from 40 to 200 students. Apart from big classrooms for teaching the courses, HCMUTE also has many classrooms with a small size which is suitable for meeting or discussion of students. The classrooms are opened from 7:00 AM to 17:50 PM and from Monday to Saturday for 11 class hours each day. Moreover, HCMUTE has seminar rooms (such as room D-102 in FEEE) which are used for holding the academic seminars, workshops, and short courses to enhance the knowledge of both academic staff and students. In addition, each department in HCMUTE has an office. The office of ACD is located on the ground floor of the Building C in which students can meet and discuss with the lecturers about their graduation thesis or any academic problems during taking the courses. All classrooms and seminar rooms in HCMUTE are equipped the multimedia equipment such as a projector, loudspeaker in order to create a better studying environment for students, air-conditioners have been installed in many classrooms and HCMUTE has a plan to equip the air-conditioners for all classrooms in next year. Furthermore, since 2015, a Digital Learning Center (DLC) supported by Intel Vietnam has been established. The DLC has modern equipment and strong servers to record and upload the online courses. With a high-speed internet connection, DLC is employed to hold the remote seminars or meetings with scholars around the world.

Although, HCMUTE has a relatively modern facilities and infrastructures serving for learning and teaching of students, HCMUTE still keep improving and upgrading new facilities with purpose to enhance the quality of education and research. Thus, every year, HCMUTE always make the plans to build new classrooms, equip more multimedia devices for classrooms in order to increase teaching and learning quality. Moreover, HCMUTE also plans to equip more new and modern equipment for practice rooms so that students can approach new technology, which matches requirement from labor market *[Exh. 9.1: Plan for upgrading the facility of FEEE]*. On the other hand, to maintain the all facilities in a good condition, the maintenance and repairing plans for facilities are scheduled. Besides, HCMUTE also has the procedure to process the emergency case when the devices are out of order to minimize the time-consuming for repairing and guarantee that the teaching and learning will not be affected by these issues.

In order to make a good plan to upgrade the facilities, HCMUTE has executed the surveys about the satisfaction of classrooms, practical rooms, labs, and equipments in these rooms from HCMUTE's staffs and students. According to the result of the surveys, the university considers and make place to improve the quality of the facilities *[Exh. 9.2: Survey and Feedback]*.

9.2. The library and its resources are adequate and updated to support education and research

HCMUTE has two libraries, a traditional library is located in the Building A of Campus 1 and a High-Quality Library (HQL) is located in the Center Building. The libraries contain a large number of documents composing of 336,112 textbooks, 117,079 books in Vietnamese, 7,843 foreign language books (served at the HQL), 2,984 under-graduated theses, 4,607 graduated thesis's, 450 reports, 298 quality standards, and over 137 magazines. In addition, this resource is complemented and updated in each semester based on the requirement of the subjects. At the beginning of each semester, the department will propose a list of additional materials which is necessary for the subjects in this semester. Therefore, the library's resources are always guaranteed to support the curriculum and learning content. Furthermore, the library has the reading rooms and it is equipped with 50 computers connected the internet in which students and lecturers can use to search necessary information. Additionally, all of the reading rooms and meeting rooms for group discussion at the HQL are equipped with the air-conditioners to create a comforable environment for students.

In working days, the libraries are opened from 7:00 AM to 11:30 AM and from 1:00 PM to 5:00 PM from Monday to Friday, however, in the final exam period, the libraries are opened from 7:00 AM to 9:00 PM. Besides, libraries also have the self-study rooms and seminar rooms in which students or lecturers can use until 9:00 PM for every working day. Librarians support students on searching and borrowing books, materials and searching for E-Learning resources. At HCMUTE, students are permitted to borrow up to 14 items each semester and 6 reference materials within two weeks. Besides the printed materials, since 2012, HCMUTE has invested the Digital Library to provide the online information and e-material resources. In order to increase the capacity for cooperation and exchange of information resources, the HCMUTE's library has actively participated in professional organizations and associations such as the Vietnam Library Association, the Library Association of Southern Universities and Colleges, etc.

The library is classified into two main sections. Section I is the service section which consist of consists of common reading room, room for borrowing textbooks and reference books, community reading room, tutoring room, and four seminar rooms. Whereas Section II is the technical and operational sections including the executive office, the readership office, the professional technical department, and the E-learning room. The computers are equipped in the reading room, rooms for borrowing textbook and reference book to help readers looking for books more easily. In addition, the library provides the free wireless networks which allows the students and lecturers can access internet to download documents anytime in entire area of the library.

Regarding the application of information technology in management, since 2002, the library has been equipped with the library management software serving for management, loaning and searching for

documents via computer systems. By 2015, the library management software system has been upgraded with a high technology foundation, and suitability with the trend of mobile technology and the increasingly demand for electronic document extraction on mobile devices. On the basis of these software systems, the libraries' resource is exploited better and more efficiently and readers can approach the documents of libraries is faster and more effectively.

In addition, HCMUTE's library has many highlight activities such as attending the conference on cooperation and knowledge exchange at Ton Duc Thang University, organizing the workshop "Application of Geogebra software in teaching and learning", building a specialized folder for automation technology, mechanical engineering, joining the book festival together with Thai Ha Book Joint Stock Company, and so on. Besides, libraries hold the seminars for students and lecturers to share not only their knowledge but also studying experiences. For example, in May-2015, a seminar about "experience on self-studying" was hold by libraries where both students and lecturers can study and share their self-studying experience. In Mar-2015, a seminar focusing on "exploit the digital resources efficiently: Situation-Technology-Solution" was organized by HCMUTE's library where the scholars will discuss and propose the solution to exploit the digital resource of library to be more effective.

Moreover, to supervise the quality of the library's service and make a plan to improve the quality of services, the library always conducts surveys from students about types of books borrowed and quality of services. Based on the responses, self-study areas were extended at the base floor and the 5th floor of the Central Building, the rest area, and seminar rooms equipped with air conditioner is built in HQL *[Exh. 9.3: Collaboration with universities and satisfactions' feedback].*

A part from two main libraries, currently, FEEE also has their own library located at Building D. The FEEE's library is a place in which FEEE's students and lecturers can have access to specialized materials, research posters, and undergraduate and graduated theses. Up to now, this library has already collected over 546 undergraduate theses, 154 master's theses, and 61 reference books. In addition, yearly, this library always updates new specialized materials, specialized textbooks as well as referent books. Moreover, the FEEE's library is also equipped a 65 inches LCD-TV which assist lecturers and students to discuss or share their knowledge easily *[Exh. 9.4: Resource information, FEEE book plans, and My OPAC]*.

9.3. The laboratories and equipment are adequate and updated to support education and research

Because HCMUTE is a technology university, the laboratories and equipment are play crucial role to enhance the quality of education and research. Currently, FEEE has 43 laboratories in total which are located in Building C and D under the management of six departments. Among of them, students of ACET can use 10 laboratories which belongs to the Automatic Control Department and 21 laboratories under the management of other departments (as shown in **Table 9.1** and **9.2**) for executing the test or practice lessons to verify the knowledge which is studied in the class. For example, in Automatic Control System lab (the room C201), students of ACET have chances to practice designing a controller for the real plants and see both the simulation results and real results. Moreover, ACET students can have opportunity to approach and practice on the new and modern PLC (Programmable Logic Controller) systems of the reputational brands which are popularly used in the industry such as Seimens (Seimens Automation lab, room D203A), ABB (ABB Automation lab, room D203B), Rockwell (Rockwell Automation lab, room D101), Panasonics (Panasonics Automation, room D205), and Omron (Omron Automation lab, room D204A). Moreover, ACET students can study, practice, and control the robots in the robotics lab at room C205B. In addition, the equipment and devices in these labs can be used for deploying the ideas in their theses as well as for their scientific research.

From **Tables 9.1** and **9.2**, it is seen that in FEEE and, in particular, Automatic Control Department possess the new and modern laboratories which are sponsored by the famous companies. For instance,

GE Training Center which is sponsored by GE Vietnam with 1 million USD investment capital and is considered one of the most modern lab in term of power engineering. The Rockwell Automation Lab is also a modern lab with 500 thousand USD investment capital which is a cooperation between FEEE and Rockwell Automation Company. Moreover, ACET also received the many supports and sponsors from other famous companies such Omron, ABB, Panasonics, and Texas Instrument to build the modern laboratories such that the ACET students can have the good opportunities to approach and practice the new and modern devices *[Exh. 9.5: Equipment and maintenance information]*.

Table 9.1: List of Laboratories under the management of Automatic Control Department

No.	Room	Laboratory Name	Course
1	D502A	Research – Project Lab For Students	Thesis, Research, Project 1, Project 2
2	C102	Intelligent System	
3	D502B	Electrical Equipment and Pneumatics	Electrical Equipment and Pneumatics, Project 3
4	D203A	Siemens Automation	Programmable Logic Controller in Practice, Data Transmission and PLC Networks, Research, Project 3
5	D203B	ABB Automation	
6	D205	Panasonic Automation	
7	D101	Rockwell Automation Lab	
8	D204A	Omron Automation	
9	C205B	Robotics	Robotic in Practice
10	C205A	Automatic Control Systems	Automatic Control Systems in Practice

Table 9.2: List of Laboratories belonging to other departments

No.	Room	Laboratory Name	Department
1	D501A	Microprocessor	Industrial Electronics-Biomedical Engineering
2	D501B	Microprocessor	Industrial Electronics-Biomedical Engineering
3	D503	Microprocessor	Industrial Electronics-Biomedical Engineering
4	D504A	Power Electronics	Fundamentals of Electrical Engineering
5	D504B	Power Electronics	Fundamentals of Electrical Engineering
6	D505	Power Electronics	Fundamentals of Electrical Engineering
7	D403A	Digital Systems	Industrial Electronics-Biomedical Engineering
8	D403B	Digital Systems	Industrial Electronics-Biomedical Engineering
9	D405	Advanced Power Electronics	Fundamentals of Electronics Engineering
10	D301A	Electrical Measurements	Fundamentals of Electrical Engineering
11	D301B	Electrical Measurements	Fundamentals of Electrical Engineering
12	D302A	Electronic Devices & Circuits	Fundamentals of Electronics Engineering
13	D302B	Electronic Devices & Circuits	Fundamentals of Electronics Engineering
14	D201	Electrical Machines	Fundamentals of Electrical Engineering
15	D204B	Electric Drives & Controls	Industrial Electricity
16	C203A	Electric Drives & Controls	Industrial Electricity
17	C203B	Basic Electrical Engineering	Fundamentals of Electrical Engineering
18	C204A	Basic Electrical Engineering	Fundamentals of Electrical Engineering
19	C204B	Basic Electrical Engineering	Fundamentals of Electrical Engineering
20	C101	GE – UTE Training Center	Industrial Electricity
21	C103A	Electrical Machines	Fundamentals of Electrical Engineering

Furthermore, in order to maintain the devices and equipment in the labs in a good condition. Every year, FEEE also have the plan to maintain, repair, and improve equipment in laboratories. All of laboratories are managed by lecturers, who have practical experiences. Therefore, when the devices or equipment are broken down, these lecturers can test or repair for faults or damaged devices during courses in a semester. After that a report is sent to leaders of FEEE to notice the situation of the equipment. At the end of each semester, Laboratory's manager checks the condition of all devices, equipment, and components in the lab then make a list of devices which need to repair or replace in next semester *[Exh. 9.6: Annual target]*.

9.4. The IT facilities including e-learning infrastructure are adequate and updated to support education and research

IT applications have been widely deployed in a plenty of the operations of HCMUTE. Currently, HCMUTE has invested a lot in IT facilities, such as 2,069 computers for all of laboratories and offices at all of faculties and units in school, 258 projectors and LCD TVs for classrooms. Most of the computers are connected to the Internet to serve for learning, teaching, and research. Moreover, there are 249 computers equipped in FEEE, most of them are installed the specialized software with student licenses such as RSLogix 5000, FactoryTalk, PanelBuilder, Cadence OrCAD, National Instrument and Multisim, to serve for studying, teaching and research. Especially, in order to strengthen the IT system, in 2013, HCMUTE has upgraded the internet network system allowing both students and lecturers can apply E/M learning with high-speed internet system. In addition, HCMUT has provided a free Wi-Fi system covering entire the main campus so that students and lecturers can easily access the information for studying, teaching and research *[Exh. 9.7: PC statistics]*.

Moreover, a dedicated PSC software system has been employed in HCMUTE to support for training, grading of questionnaires, asset management, library management, personnel management, doing surveys from students, lecturers, and staffs. With the aid of this software, HCMUTE can manage the activities easily, effectively, and conveniently. On the other hand, students and academic staffs are provided a private account and they can use the email with @hcmute.edu.vn domain for staffs or @student.hcmute.edu.vn for student to login their account. For example, the student can access to their account to check or view grades, timetables, exam schedules, tuition fees, and so on via http://online.hcmute.edu.vn, or they can also register courses online at website https://dkmh.hcmute.edu.vn and download materials from http://thuvien.hcmute.edu.vn. In addition, students can take the online course or access the class materials at https://lms.hcmute.edu.vn. For academic staffs, they can access their account to check information of the courses, posting materials, interacting with their students via website https://lms.hcmute.edu.vn. Moreover, all of notices and necessary information will be provided for staffs via http://eoffice.hcmute.edu.vn. Additionally, all of departments, faculties, and units in HCMUTE also have their own websites to introduce about their mission, staffs' information, and update information. For instance, the FEEE's website http://feee.hcmute.edu.vn supplies a lot of information about the programmes, announcements, job requirements, activities, technology information, and lecturer information. Furthermore, the information of Labs, short-term courses, and research activities are also provided in this website as well.

Especially, in March 2015, a new Digital Learning Center (DLC) with the latest technology in video conferencing, and collaboration software and hardware was established in HCMUTE *[Exh. 9.8: Decision on establishing Digital learning room]*. The DLC has a seating capacity of 50 people arranged in 07 workstations. Each workstation is equipped with tools to support for virtual collaboration *[Exh. 9.9. MOU information]*. With the support of DLC, HCMUTE can connect with Arizona State University (ASU) and other institutions all over the world to create an interactive channel between faculties and students. On the basis of these type of global interactions, the competitiveness of HCMUTE' students will be increased by equipping them with the essential skills which are matched with the requirements of today's workforce, such as teamwork, problem-solving, project planning, presentation skills, and English skills.

Additionally, with the aid of DLC, HCMUTE has encouraged the lecturers applying hybrid learning and E/M learning as much as possible. Until now, there are more than 1000 lessons which are recorded and upload on internet. By sponsored by Pearson Company and DLC, several hybrid learning activities has been deployed in HCMUTE such as mobile learning and e-learning. Furthermore, all courses of FEEE are applied the hybrid learning in which the students can interact with lecturers in the classroom and lessons on the internet *[Exh. 9.10: Information of courses applying DLC in LMS]*.

9.5. The standards for environment, health and safety; and access for people with special needs are defined and implemented

HCMUTE always aims to create a green and clean campus. From 2000, smoking has been prohibited in all campus of HCMUTE. Trees are planted more every year. Before graduating from HCMUTE, most students donate a small amount of money in a fund to plant new trees around campus. Each semester, a special event called "Green Sunday" is hold where volunteer students and staffs will attend this event to clean up the campus. Moreover, HCMUTE also has the policies and measures to avoid wasting water and electricity in the campus. HCMUTE has actions to enhance the awareness of both students and staffs about saving water and electricity such as the notices to remind staff to turn off all devices before leaving and save energy to be put in every office. Furthermore, at the end of each day, the securities will go to check around campus again to guarantee that all electrical devices have been turned off. Additionally, waste water is treated based on the regulations about environment protection of Vietnamese government. A waste-water treatment process system is constructing in HCMUTE with 1.5 million USD investment capital which is able to process all of waste-water of HCMUTE. Regarding solid-waste and chemicals, HCMUTE has employed a waste process company which can collect and process the waste following the regulations of Vietnam.

HCMUTE always have the detail health-care policies to assist them having the best health condition. For example, all lecturers and staffs will have an annual health check-up. Lecturers and staffs are provided with both health and accident insurances. For students, all incoming students are required to have a health check-up before enrolling HCMUTE and they also have health insurance coverage. Moreover, HCMUTE has a clinic in which students, lecturers, and staffs can have first aid in emergency cases or can be treated with the simple diseases. The clinic also has a responsibility to discover and prevent the epidemics, for instance, the clinic will spray pesticide to kill the mosquitoes and insect around the campuses to prevent the malaria. Moreover, during studying, HCMUTE supports and consults any issues related to psychology, health, disease prevention and treatment directly or via email and announcement on the HCMUTE website. Besides, HCMUTE also has football playground, tennis court, and multi-function stadium in which students and staffs can participate in the sport activities to enforce their health. On the other hand, HCMUTE always encourage both students and staffs to improve their health by holding the sport activities such as the football competition, race competition, and so on. Additionally, food safety is one of the important issues which is considered in HCMUTE. HCMUTE will go to check the food in all cafeteria inside the campuses to make sure that food of these cafeteria is safe and in good condition *[Exh. 9.11: Healthcare and disease prevention lists]*.

In term of safety, all laboratories in HCMUTE have regulations about health and safety. Each lab has dangerous warnings and is equipped with medicine cabinets to ensure first aid. In the Labs of FEEE and ACET, all safety regulations are written clearly and posted. Because in almost all FEEE's labs, students and lecturers will work with electricity, therefore, both students and lecturers in the lab have to wear safety shoes and special clothes to ensure the safety during studying in the lab. At the beginning of the practical courses, lecturers will notice all safety regulations for every student in the class. In addition, during practicing, lecturers have to monitor group by group to guarantee that the operations of the students are safe and correct.

At the present, HCMUTE's security guard team consists of 22 people who are responsible to ensure the safety of the whole university 24/7. They often attend the professional training courses following the planned schedule every year. The team educate staffs and students on the regulation and use of the firefighting equipment during an emergency. Moreover, every year, a fire rehearsal is taking place at the main building. On the other hand, the local fire fighter center will send several staff to HCMUTE to check all the equipment yearly to ensure that they are always in good condition. For the emergencies, Carbon dioxide fire extinguisher are installed and the fire hotline 0283.7201.269 is provided in classrooms, laboratories, and workshops *[Exh. 9.12: HCMUTE security information]*.

10. Criterion 10: Quality Enhancement

10.1. Stakeholders' needs and feedback serve as input to curriculum design and development

The ACET programme was designed based on the CDIO approach, the MOET, orientations of the professional organizations, mission and vision of HCMUTE, mission and vision of FEEE, and feedback of stakeholders such as employers, alumni, lecturers, and students through surveys, academic meetings, and scientific seminars. The curriculum of the ACET was developed to meet the requirements and needs of stakeholders**.**

HCMUTE has the ISO procedure for management of curriculum design and improvement. There are two processes relating to the gladdening of stakeholders including current students, graduats and companies to the programme and the satisfaction of students including Planning - Survey - Statistics – Recommendation for improvement. AAO is responsible for advice, as well as report to the HCMUTE president Board about the action of the curriculum *[Exh. 10.1: ISO procedure of management with specific guidelines]*.

At the end of each semester, ACD organize meetings to share information related to the content of courses, teaching and learning methods, lecturer's feedback for improvement. Besides, student's feedbacks are also collected through comments on the personal dashboard of lecturer or the group Facebook for each subject, paper surveys and meetings face to face between students and head of departments and faculty board. Especially, students fill out the survey about the teaching quality of lecturers as well as the service of the university. The content of the survey form for lecturer course including 4 criteria relating to the teaching method, the content of the course, testing and assessment, pedagogical manner, and other comments.

The other channels to collect the feedback from the graduates are performed by the QAO with three months and a year after graduation as well as through the annual meeting of FEEE alumni association meeting (on Sunday before 20th November), the survey form is designed and given to all attendees. From these feedbacks, the department can recognize and plan to enhance the curriculum following the ISO management procedure.

The collection of feedbacks and comments from the stakeholders plays an important role in the curriculum development. Thus, one of the common activities of the ACD is collecting feedback from the stakeholders through surveys, meetings, and workshops. These feedbacks are analyzed to select the reasonable feedbacks for improving the curriculum. The final revised curriculum is validated by the ASC. For more details, **Table 10.1** presents the fulfilments for the requirements or suggestions from stakeholders in ACET programme. For example, in 2012 many feedback from employers shown that a lack of soft skills among graduates, the Introduction to ACET course is designed by lecturers who attended the training active teaching and learning methods in HEEAP program in America for a freshman to attract them with their interest future carrier by a mixture of lectures, soft skills, and factory visits.

The curriculum and its courses are always improved and adjusted to meet needs of stakeholders. In particular, credits of the curriculum were reduced from 189 in 2008 to 150 in 2012. Although the number of credits is reduced, English, soft skills, and teamwork are improved by integrating some

courses as shown in **Table 10.2.**

Table 10.1: Suggestions of stakeholders for improving the programme

Academic year	Requirements/ Suggestions	Stakeholders	Fulfillments	Evidence
2012	Improve students' ability in English communication	Alumni, Students,	Improve the quality of English courses and apply English in teaching	*Curriculum-2012*
	Orientation to ACET for students and soft skills	Employers	"Introduction to ACET" course is added	
2012-2013	Propose a teaching assistance	Lecturers	Design regulations on teaching assistants	*A decision on TA*
2013-2014	Students have to spend days for social activities during the programme	University	Set community service and social work as a requirement for graduation	*A decision on the enhancement of Social activities*
2015	Improve assessments	Lecturers, University	Change formative assessments: online quizzes, teamwork, representation	*Syllabus 2015*
	Enhance English in teaching and learning	Alumni, Employers	Use lecture notes and PowerPoint slides in English	
2017	***Improving student assessment***	Students, Lecturers	Use rubrics for projects, thesis, and labs	*Syllabus 2017*
2018	***Interdisciplinary and teamwork skills***	Employers, University	Integrate courses' content, online teaching/ learning, MOOCs, capstone project	*Curriculum-2018*

Table 10.2: Adjustment in the ACET programme applied since 2012

No.	189 credits curriculum (2008 to2011)	Credits	150 credits curriculum (2012 to 2017)	Credits	Notes
1	Electric Circuits 1	3	Electric Circuits	4	Integrated
2	Electric Circuits 2	3			
3	Basic Electronics 1	3	Basic Electronics	4	Integrated
4	Basic Electronics 2	3			
5	Measurement and sensors	2	Programmable Logic Controller	3	Integrated
6	Programmable Logic Controller	4			
7	Electric Safety	2	Electrical Power System	3	Integrated
8	Power supply	4			
9	Automatic control systems	4	Automatic control systems	3	Reduced
10	Robotic in Practice	2	Robotic in Practice	1	Reduced
11	Internship	3	Internship	2	Reduced
12	Practices	22	Practices	18	Reduced
13	English for Special Purpose	3	English for Special Purpose	0	Eliminated
14	Graduation Thesis	7	Graduation Thesis	10	Increase
15	Introduction to ACET	0	Introduction to ACET	3	Increase

10.2. The curriculum design and development process is established and subjected to evaluation and enhancement

HCMUTE has applied ISO management procedure for designing and revising the curriculum since 2005. In which, curriculums are evaluated for enhancement every two years *[Exh. 10.2: Decision 07/2015/TT-BGDĐT, 17/04/2015]*. Besides, every year, based on the regulation of HCMUTE one programme can be adjusted around 5 - 7 percent of the total credits. The adjusted curriculum is announced and posted on the website of FEEE and ACD. Based on the feedback information from stakeholders, at the meeting of the department, ACD will discuss and ask lecturers for adjusting the content. After that, Head of ACD will present and ask the SAC of FEEE to make the decision for adjusting the curriculum, including courses and syllabi. For example, in this programme, we designed a course namely Practical topic that will be taught in the last semester with the content updated following the needs of industry *[Exh. 10.3: The decision for adjusting the curriculum]*.

From feedbacks of stakeholders, HCMUTE made the decision to revise the curriculums with 189 credits designed from 2008 to 2011 to be 150 credits from 2012 to 2017 and become 132 credits in 2018 for improving the curriculum. In which, the new curriculums were designed to increase soft-skills for purpose of enhancing the self-studying and were benchmarking with other domestic and international programs.

Table 10.3: Comparison between programme structures

Clusters	**189 credits** (2008 to 2011)	**150 credits** (2012 to 2017)	**132 credits** (from 2018)
General courses	**66**	**56**	**49**
Introduction to ACET	0	3	3
Mathematics and natural sciences	30	23	22
English	15	9	0
Information technology	5	3	3
Human sciences	5	6	4
Political education and General laws	11	12	12
Fundamental courses	**58**	**37**	**32**
Theory	56	35	30
Specialized courses	**33**	**27**	**27**
Theory	32	24	24
Course projects	1	3	3
Practice/ Experiment	**24**	**20**	**17**
Internship	**3**	**2**	**2**
Graduation thesis	**7**	**10**	**7**
Total	**189**	**150**	**132**

Table 10.3 shows the comparison between programme structures. In which, some courses were adjusted by integrating, replacing and changing their credits from 2008 to 2012 and 2018. Since this SAR is only focused on 150 credits curriculum, the new 132 credits curriculum, which has just applied in 2018 is ignored.

When adjusting the curriculum, the ACD benchmarks it with national and international curricula which are very close to the automatic control field. It means that the ACET programme was designed based on the similar education programmes of the national and international universities such as

HCMC University of Technology (HCMUT), International University, The University of Colombo, Chulalongkorn University, and Purdue University (see **Table 3.4**).

10.3. The teaching and learning processes and student assessment are continuously reviewed and evaluated to ensure their relevance and alignment

The HCMUTE deployed the ISO procedure to ensure the quality of all programmes under the supervisor of the QAO for quality assurance. It Includes setting up and revising curriculum; planning and implementing teaching; inspecting and examining the compliance with teaching statute of lecturer; classroom observation; planning and organizing examination; composing and keeping confidentially the test, replicating writing test; delivering, receiving the test and grade; monitoring final examination; reviewing completion of courses and qualification for graduation; managing and awarding certificate procedures to help department check and control the activities easily.

The ACET programme and its courses are always enhanced and evaluated to meet access needs. Such as, reduced from 189 to 150 credits of the curriculum in 2012. In which, soft-skills are added, contents and assessments of courses are adjusted that will help students improve their self-study based on online materials through LMS and support from teaching assistance system.

Besides, the content of the Introduction to ACET course is designed by adding many activities to introduce freshman the career orientation, teamwork, discussion, presentation, writing report, writing email, job opportunity, and roles of ACET engineers in society to develop a passion for learning.

Moreover, each semester, the department has the plan to observe the lecturers in the classroom to evaluate the teaching methods and the contents. After that, some comments will be discussed to help them improve. In case of lecturers who teach same courses, they have to discuss at the beginning and the end of each semester to make sure that the content and assessment methods are aligned.

For improving, lecturers of FEEE have been trained about the active learning, teaching methods from the university and other programs such as HEEAP, COMET, VULII, BUILT-IT, ITEC. Besides, HCMUTE got the LMS system to help lectureres and students interact in anytime.

For improving English ability of students, HCMUTE has encouraged lecturers using English in teaching such as using English textbooks, bilingual lectures or teaching in English. For example, posters in thesis oral defence are required to design in English *[Exh. 10.4: Poster of the final project]*.

For assessing students, formative assessment increase from 30 to 50 percent of the total grading in 2008 and 2012, respectively, and summative assessment is the remaining grading. In the formative assessment, at least twice a semester with different kind tests such as online quizzes and homework in the LMS system, paper test in class or reports. With the summative assessment, some courses are in paper-based tests, which are organized by the AAO at the end of the semester. Besides, for evaluating the soft-skills of students, some courses are changed to project-based assessment such as Robotics and Data Transmission and PLC Network courses. In each syllabus, student assessment activities are planned and introduced students at the beginning of each course for purpose of helping students achieve the learning outcomes *[Exh. 10.5: Assessment decision and policy]*.

All improvements in teaching and learning activities of lecturers to ensure students achieve the learning outcomes of the curriculum. In practice, ACD requires lecturers using rubrics for evaluating students in all Projects and Practical courses *[Exh. 10.6: Rubric for Projects and Thesis]*. Furthermore, each lecturer must prepare the Portfolio for each course. Base on this material, the lecturer can review the content of the lecture for improvement. At the end of the semester, lecturers can see the statistics of the survey from students to evaluate their courses. It is very helpful

information for them to improve their teaching *[Exh. 10.7: Course Portfolio]*.

In the beginning and at the end of every semester, ACD often has the academic meeting so that lecturers discuss together and show their contributions related to the past courses. From this meeting, the significant feedbacks are considered for improvement of the curriculum to enhance learning outcomes *[Exh. 10.8: Department meeting minutes]*.

Thanks to these improvements, there are some outstanding students of this programme won the SHARE scholarship to study overseas at University College Cork, Ireland and University Malaysia Sabah, Malaysia. It means that the ACET curriculum of this programme was accepted by other universities. Moreover, graduates from this programme can apply to study postgraduate programmes at almost universities over the world *[Exh. 10.9: Students won SHARE scholarship, International collaboration]*.

10.4. Research output is used to enhance teaching and learning

Scientific research plays an important role for improvement of learning and teaching to the lecturers and programme. There are many levels of the project, for example, ministry of education and training level, university level, or from the companies. In which, lectures not only focus on the solving problems for the industry but also adjust textbooks or add exercises, design experimental or simulation models for some courses. Lecturers participating in scientific research can apply their research results to improve the courses as well as inspire and guide the student to do research.

In ACD, some practical models were designed by lecturers such as the Flow rate controller, Pressure controller, Step motor controller, Temperature controller, etc. to train students in Programmable Logic Controller in Practice course *[Exh.10.10: Research output application]*.

Moreover, students can join to do a project with lecturers to help them improve their knowledge and skills especially in practice. The HCMUTE encourages and supports funding for students to do research projects under the instruction of lecturers. Some labs in ACD have equipped new and modern devices such as Rockwell Automation Lab, Robotic lab, and Intelligent System lab for students to develop and test their models. Students can use their research results and development for their capstone project or publish papers with their supervisors. In addition, students of the ACET programme are encouraged to participate in competitions at different levels. There have been competitive programs such as Rockwell Automation Competition, Led Matrix Design, and Robots Moving on Maze Map *[Exh.10.11: Student's prizes in competitions]*.

10.5. Quality of support services and facilities (at the library, laboratory, IT facility, and student services) is subjected to evaluation and enhancement

For improvement of teaching and learning after receiving feedback from students and lecturers through the annual surveys, HCMUTE has invested many facilities such as large LCD smart TVs in classrooms to support teaching and studying. Especially, the Digital Learning room that is supported by ASU and USAID has been built to support lecturers to prepare their lecture and video as well.

Besides the teaching and learning activities in class, HCMUTE has designed many public studying spaces for students to help them in studying and working in groups such as the base floor and the 5th floor of the Central Building, the garden between Building C and Building D, etc. The average building space for teaching and learning of a student is 3.95 m^2 per student, higher than current regulation i.e. 2.5 m^2 per student *[Exh. 10.12: 32/2015/TTBGDĐT (16/12/2015)]*.

As an annual activity, many surveys have been collected by Library, Laboratories, Student service, Dormitory, Health service, and Hygiene environment for evaluation and enhancement *[Exh. 10.13: Dormitory, Library, Lab, SSC, Health Care surveys]*.

Library: The library of HCMUTE has been built the portal system to provide online information and

electronic documents for readers since 2012. In order to supply updated information for researching, library bought 20 accounts from the Information Center of National Science and Technology. Besides, the library not only creates the comfortable environment with reading rooms, discussion rooms, and a tablet for online reading but also equips massage chairs and hammocks for students to relax *[Exh. 10.14: Library information]*.

Laboratory: Beside equipment supported by the university, some labs receives donations from companies related to the automatic control field such as UTE - Rockwell Automation Lab and Panasonics Lab. To guarantee all equipment working properly, the laboratory manager carries out measuring and testing the equipment and sends statistic reports of the broken equipment to replace or upgrade them. All equipment is managed by QR code. Furthermore, the head of the laboratory's information such as name, email, cell phone number as well as opening and closing time are published. After finish class, students are required to clean the room and arrange all equipment to the right position. At the end of the semester, the laboratory manager must list all equipment and evaluate the situation of them to plan for replacementnt. The 5S methodology has been applied for laboratory since 2015 *[Exh. 10.15: Equipment maintenance]*.

Student service: The Student Service Center founded in 2013 to support students in learning, part-time jobs, entertainments, sports, physical activity, life skills, psychological counseling and other activities which are shown on the website of http://ssc.hcmute.edu.vn.

Health service: For all students, the mandatory health insurance is required. To support students and staffs in health care, HCMUTE has the medical centre. Moreover, all staffs and lecturers are supported and introduced to the large hospitals of HCMC for the annual health checking. Besides, HCMUTE collaborates with local health care station to spray chemicals for preventing the epidemic disease from mice, mosquito, insects and others. The medicine cabinet's first aids are also consulted and required to install in labs *[Exh. 10.16: Healthy support decisions and the environment]*.

Dormitory: Currently, there are two dormitories with building size 18,965 m^2, all rooms are equipped with necessary equipment for a living and studying needs of students, as well as a canteen, playground, gym, self-study area, are designed. In the development strategy of 2016-2020, HCMUTE will plan to build one more dormitory with the comfortable environment.

Hygiene and Environment: The University hires sanitation workers from the Department of Hygiene and Environment to assure safe hygiene in all areas *[Exh. 10.17: Hygiene and environment at Buildings for students]*.

It is obvious that HCMUTE always has plans to improve facilities to meet the needs of teaching and studying for development.

10.6. The stakeholders' feedback mechanisms are systematic and subjected to evaluation and enhancement

For designing and improving the ACET curriculum, FEEE has many surveys from stakeholders such as enterprises, students, lecturers, alumni using the ISO management procedure. The Plan – Do – Check – Act (PDCA) process is also applied for continuous improvement as follows:

Step 1 (Plan): Based on ISO management procedure, the survey forms are designed by the department and faculty to deliver to stakeholders every year.

Step 2 (Do): The surveys are sent to stakeholders and then feedbacks are collected through emails, post or other channels.

Step 3 (Check): The collected survey results are sent to the department for feedback's analyzing. Then, ACD meet with lecturers to analyze weaknesses and strengths and compare to the proposed plans to show solutions for improvement of the curriculum.

Step 4 (Act): The changing in the curriculum will be approved to the ASC. Once the ASC is accepted the improved curriculum will be applied for next semester.

Table 10.4: Types of surveys

No	Survey's name	Stakeholders	Times/ Year	Time	Method
1	Teaching quality survey	All students	2	The end of each semester	- Online (PSC) - online.hcmute.edu.vn
2	Newly graduate survey	Graduated after 3 months	2	1st: May; 2nd: November	- Online (PSC) - online.hcmute.edu.vn
3	Alumni survey	Graduated over 1 year	2	November	- Online-Google form - paper forms
4	Student's satisfaction survey on service quality	All students	1	January	- Online (PSC) danhgia.hcmute.edu.vn
5	Workplace satisfaction of HCMUTE's staff survey	All current staffs at HCMUTE	1	October	Online-Google form
6	Employers' survey	Companies	1	July; February	- Online-Google form - Paper form
7	Student's satisfaction survey on studying course	Lecturers	1-2	During course	- Online-Google form - Paper form

There are some surveys usually used in HCMUTE to get feedback from stakeholders shown in **Table 10.4**. Base on the results of the feedback, the curriculum of ACET has been changed not only the content but also the learning and teaching methods to meet the stakeholder needs. The contents of the surveys are revised to collect more information to help the department figure out the weak points of the programme for improvement *[Exh. 10.18: Feedback's mechanisms]*.

Since 2014, the HCMUTE has invested in the high-speed Internet system for the online learning and teaching management software. Higher speed Internet also help with conducting online surveys and support for academic problems.

In addition to students, QAO usually sends the survey to the lecturers to collect the information about the working environment as well as their expectations. Besides, in each course, lecturers can design the survey by themselves using LMS to collect more feedback from students relating to the understanding of the lecture, the teaching, and learning methods. These surveys will help lecturers to adjust their teaching methods for improvements.

11. Criterion 11: Output

11.1. The pass rates and dropout rates are established, monitored and benchmarked for improvement

The AAO will provide the statistic figures of pass rate and dropout rate of students to the FEEE and Board of President. On these figures, the FEEE establishes benchmarks of these rates at the beginning of the school year and devise an appropriate plan to achieve this goal. A Dashboard system was also

developed to help faculty and departments monitor the pass rate and dropout rate of their students *[Exh. 11.1: Pass and dropout rates from the Dashboard system, ASAO, and Benchmark]*.

The Dean of FEEE has the right to access data from the Dashboard system. Based on results from the Dashboard system, ASAO and AAO, FEEE hold meetings to analyze pass and dropout rate of different majors in detail *[Exh. 11.2: Department meeting minutes, group meeting]*. Through the meetings, the FEEE will determine the causes, set the benchmark for the next semester, and propose the effective solutions to support students and lectures achieving the goals.

Table 11.1: Percentage of pass and dropout of the ACET programme

Academic year	Cohort size	Percentage of completed first degree (%)			Percentage of dropout during (%)		
		3 – 3.5 years	4 years	> 4 years	1st year	2nd year	>= 3rd year
2014-2015	245	-	-	-	-	3.0	3.0
2013-2014	292	0	46.85	43.24	2.70	4.50	2.70
2012-2013	307	0	46.15	43.59	3.85	3.85	2.56
2011-2012	291	0	45.00	43.75	3.75	5.00	2.5
2010-2011	241	0	43.55	43.55	4.84	4.84	3.22
2009-2010	231	0	42.00	44.00	4.00	4.00	6.00

The dropout of the students may be from several main reasons as follows:

- The students did not accumulate the required credits;
- The students can not complete their graduation thesis on time;
- Their English level did not satisfy the requirement of HCMUTE *[Exh. 11.3: Effective solutions to support students and lecturers]*.

In order to increase the pass rate and reduce the dropout rate, the FEEE has employed many solutions to support students when they are studying at HCMUTE which are illustrated in the **Table 11.2** as follows.

Table 11.3 shows the figures of the planned, actual pass and dropout rates of the students in four academic years from 2009-2010 to 2013-2014. From this table, it is seen that the pass rate has been increased from 86.00 % (in 2009-2010) to 90.09 % (in 2013-2014). It proves the effectiveness and merit of the proposed solutions of the FEEE for enhancing the pass rate.

Table 11.2: List of the solutions to reduce the dropout rate

No.	Issues of students	Solutions
1	Students cannot afford living cost and tuition fee; or they have to spend much time doing part-time job therefore they cannot complete the required the accumulative credits.	- The SSC, the communist youth unit, and the FEEE will help the students to find the suitable jobs. - The SSC set up a sharing corner in which everyone can share any essential items such as clothes, books, etc. to other's. - HCMUTE and FEEE provide the scholarships to support for students. - Holding a campaign for calling the donation from industry to establish a scholarship fund. *[Exh. 11.4: Scholarship sources for students]*.

2	Students cannot understand the lesson in the class	- Except for the teaching time in the class, lecturers and TA are always willing to answer any question related to the lesson directly or via email. - Using rubrics for assessment also helps the students understand well what they need to learn to pass the exam. *[Exh. 11.5: Rubrics for assessment, teaching assistance system, summer semester, Laboratory's system improvement]*. - Organize an extra semester in summer vacation to assist the students to be able to complete the program on time.
3	Students are lack of the motivation for studying	- The FEEE also proposes another method to enhance the pass rate such as holding the field trips to factories and encouraging lecturers to upgrade the new teaching methods to inspire the passion of students. *[Exh. 11.6: Field trips for students]*. - Award scholarships for students who have excellent performance.

Table 11.3: Planned and actual pass and a dropout rate of ACET from 2009-2010 to 2013-2014

Academic Year	2009-2010		2010-2011		2011-2012		2012-2013		2013-2014	
	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planed	Actual
Pass rate (%)	90	86.0	90	87.1	90	88.75	92	89.74	92	90.09
Dropout rate (%)	10	14	10	12.9	10	11.25	8	10.26	8	9.1

11.2. The average time to graduate is established, monitored and benchmarked for improvement

According to a programme of HCMUTE, the average time for students to graduate is around 4 years. Students with good ability and finance reduce graduation time to less than 4 years. Students can extend their study up to 8 years. To graduate from HCMUTE, from 2008 to 2011, students have to complete 180 accumulative credits. However, the number of credits has been reduced to 150 credits from 2012. The figures for the planned and actual average graduation time of ACET are presented in **Table 11.4** as follows.

Table 11.4: Planned and actual average graduation time of ACET from 2009-2010 to 2013-2014

Academic Year	2009-2010		2010-2011		2011-2012		2012-2013		2013-2014	
	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planed	Actual
Within 4 years (%)	60	42.00	60	43.55	60	45.00	62	46.15	62	46.85
More than 4 years (%)	30	44.00	30	43.55	30	43.75	30	43.59	30	43.24

Table 11.5: List of main reasons and solutions for reducing the graduation time of ACET

No.	Issues of students	Solutions
1	Students cannot pass the necessary credits to graduate on time.	- Lecturers and TAs will answer any question related to the lesson directly or via email. - Using rubrics for assessment also helps the students understand well what they need to learn to pass the exam. *[Exh. 11.7: Rubrics for assessment, teaching assistance system, summer semester]*.

		- Lecturers always upgrade the teaching method such as using pictures and videos, project-based learning, LMS, introductory subject, group discussion to inspire students. - The assessment methods are also improved by focusing on the whole process studying. For example, the quiz, homework, and assignments are included in the assessments to help the student have more chances to pass the course. - Organize an extra semester in summer vacation to assist the student to be able to complete the programme on time. *[Exh. 11.8: Mini-test, a mid-term evaluation, LMS, project-based learning]*.
2	Students spend a lot of time for the part-time job to earn money for living expense and paying tuition fee.	- HCMUTE has the policy of financial support the poor students such as tuition waiver, tuition fee reduction as well as scholarships. - Aluminum of FEEE and companies also provide many scholarships to FEEE students.
3	The students is unable to complete their final theses on time.	- The labs of FEEE will be opened such that students can use the devices and equipment of the labs for completing their graduation thesis. - Advisors often support students the knowledge as well as discuss with students to solve the problems which encounter during research.
4	Students cannot qualify the requirement of English level on time.	- Establish English Club to help students to improve their English skills. - All lesson in the class of FEEE are written in English. Besides, the students are required to read the English reference books or manual of devices to improve the English skills.
5	Students, who failed the courses, need more opportunities to complete their courses	- Organize the extra semester in the third semester in Summer time. - Create many elective courses and relevant courses in the curriculum.

It should be noted that prolonging studying time will make the students spend more money and time in school. Therefore, reducing graduation time is one of the crucial goals of the FEEE. To obtain this objective, the FEEE has pointed out several main reasons and proposed the solutions to overcome these issues which are presented in **Table 11.5**.

11.3. Employability of graduates is established, monitored and benchmarked for improvement

Table 11.6: Employability rate of ACET graduates from 2014 to 2018 in (%)

Year	Immediately after graduation	Within one month	Within three months	Total
2018	42.7	11.4	7.8	61.9
2017	41	15	7	63
2016	32.5	14.3	6.75	53.55
2015	29.7	13.8	6.42	49.92
2014	19.3	21.0	13.8	54.1

Before 2013, the ASAO carried out the printed survey of the students who have found a job within three months, then the obtained results of the survey are used for all faculties of the HCMUTE. However, from 2014, the online survey has been applied by QAO to collect the figure of the number of students who have a job within three months which is shown in **Table 11.6**. With the online survey, it is easier to separate data for graduates of each programme *[Exh. 11.9: Online survey of employability of graduates]*.

There are many reasons which may impact on the employability of the graduate students. In order to find out exactly the main factors, the FEEE relied on getting feedback information from alumni which is collected in Alumni days and via job surveys. Besides, FEEE and ERO also have the meeting with the companies to collect the requirements of the recruiters *[Exh. 11.10: Meeting with students, Alumni, and companies]*. On the basis of this feedback information, the FEEE will point out the main factors affecting on the employability of the graduates and proposed many good solutions to reinforce necessary skills for a job which are demonstrated in **Tables 11.7**.

Table 11.7: Factors affecting on the employability of ACET students and solutions

No.	Factors	Solutions
1	English are not good enough.	- Establish the English clubs. - Open free English classes for lectures to improve the lecturer' English skills then encourage lectures teaching in English. - Most courses will use the reference book in English and lecture notes are written in English to create the environment for students to practice English *[Exh. 11.11: Activities of English classes and clubs]*.
2	Lack of soft skills and teamwork skills.	- The FEEE combined with Communist Youth Unit holds many soft skills courses in a year such as developing communication skills course, conversation mastery course, group working skills, and leadership skills course to improve the soft skills for students *[Exh. 11.12: Activities of soft skill classes and advisory]*. - Soft skills have been integrated into many subjects such as Project 1, Project 2, Project 3 and capstone project (final project). In these subjects, students are divided into groups to study and report their results. The assessment is not only based on the results but also depended on their presentation skills *[Exh. 11.13: Report and assessment for Projects 1, 2, 3 and capstone project]*.
3	Lack of the self-study and research skills	- The FEEE has labs to support for research activities of students. - Students can attend the research groups of lectures of the faculty for enhanced research ability *[Exh. 11.14: Activities of open labs and research groups]*. - Students study the Project 1, Project 2, Project 3, and Thesis to improve the self-research skills.
4	Lack of the information of job	- The FEEE hold many employment promotion activities such as job affair and field trips. - The FEEE has a good relationship with companies such as Vinamilk Factory, Procter & Gamble, Phu My Fertilizer Plant, Petro Vietnam CaMau Power Company, Nestle Company, and others to increase the employability of graduates *[Exh. 11.15: Field trip, Labor market event, technology transfer]*.

Besides, the ASAO reinforces advisory activities about the HCMUTE to help the students choose a suitable major for learning *[Exh. 11.16: Activities of soft skill classes and advisory]*.

11.4. The types and quantity of research activities by students are established, monitored and benchmarked for improvement

The overall objective of the HCMUTE and the FEEE is to build a study programme to meet the requirements of companies and labour market. To achieve these goals, the graduates must have essential competencies such as planning, analyzing, designing, implementing, and solving problems. Furthermore, the students have to be equipped the presentation skills, teamwork skills, and research ability. Therefore, the FEEE has the meetings and proposes specific research objectives for Departments. Afterward, the FEEE sets up the professional board to assess the research results of the students and lecturers. Through the assessment meetings, the board will make suggestions for the further studies.

Besides, the students must take part in many different research activities during learning. For example, they must pass the Project 1, Project 2, Project 3, and capstone project to improve the self-research skills. Through these projects, the students are familiar with basic steps in the research process such as research proposal, literature review, conducting research, writing reports, and presenting research results. Afterward, they participate in a capstone project to achieve advance skills such as team work, analyzing, synthesizing skills, and independent research ability.

In addition to project-based learning, the students can attend to annual research activities funded by the HCMUTE or join lecturer's research groups to study in the open labs of the FEEE. Students are able to receive financial support and be able to use equipment during studying. Furthermore, they can get valuable rewards when their studies attaining the good results *[Exh. 11.17: Guide to register and research process of student]*.

Finally, the FEEE work together with the Communist Youth Union and external organizations such as Saigon Hi-Tech Park (SHTP) to hold many different competitions such as LED design, finding road robot, Holcim prize, Programming with Omron Equipment, PLC Panasonics as well as Programming with PLC Allen Bradley, and Eureka award. Via these competitions, students have obtained the essential experiences and skills for finding a job after graduation *[Exh. 11.18: Activities of student competitions and rewards]*.

In addition, many experts are invited to the HCMUTE to introduce new technologies to the students and lecturers. Moreover, many workshops related to automation and control fields have held by the ACD and FEEE such as Omron Solutions, Quanser devices, Univeral Robot solution, etc. *[Exh. 11.19: Workshops information]*.

Through the active science and technology activities, the number of research projects which are executed by students is rapidly increased as shown in **Table 11.8**.

Table 11.8: Number of funded research projects of students

Number of funded research projects					Average
2013	2014	2015	2016	2017	
5	11	13	14	21	13

11.5. The satisfaction levels of stakeholders are established, monitored and benchmarked for improvement

HCMUTE and the FEEE increase stakeholders' satisfaction in many different ways. For example, the HCMUTE and the FEEE hold the meetings annually at the faculty and the university to discuss the factors relating to satisfaction of the staff.

For staff, the QAO sends the online survey to them to collect their feedbacks of satisfaction of working environment. After getting all feedbacks from the meetings and online survey system, HCMUTE examine the issues in detail and proposed the solutions to boost staff's satisfaction levels. For instance, the KPI system is one of the solutions to increase the satisfaction of the staff. Based on the KPI system, the lecturers can select the suitable workload policy. In particular, some lecturers can choose research workload over teaching, others prefer teaching workload to research. This policy is flexible and assist the lecturers in taking advantage of their strengths to work more effectively.

[Exh. 11.20: FEEE meeting, online survey for staff]. HCMUTE creates a comfortable working environment for staffs in order that staff can work at HCMUTE for the long-term. HCMUTE also has many good policies for staffs, for example, staffs support the lunch in HCMUTE's cafeteria with discount price. The income of staffs in HCMUTE is yearly increased and higher than many universities in Vietnam. HCMUTE has the compliment policies for the staffs to encourage them when they have good performances. Besides, HCMUTE also has the financial support for lecturers to attend the international conferences or take part in the courses to enhance their knowledge and working skills.

For students, the QAO sends the survey to them to get feedback at the end of the semester. The feedbacks are transferred to the leader of units. The FEEE and department will have the meetings to analyze and give solutions to raise satisfaction in the next semester. For example, installing an extra Wi-Fi system, air conditioner for labs, handrails for disabled persons are solutions that came from the feedbacks of the students. Besides getting feedback from the online system, the FEEE usually holds meetings to solve the unsatisfactory problems every semester. **Table 11.9** provided the satisfaction of HCMUTE students in two years 2015 and 2016.

Table 11.9: The satisfaction of the students in 2015 and 2016

Year	Lecturers (%)	Classroom and equipment (%)	Practice rooms and equipment (%)	Services (%)
2015	90	80	68	69
2016	97	86	88	81

Finally, yet importantly, the FEEE also carry out the surveys about the programme from both the alumni and the recruiters. Based on their feedbacks, FEEE will update study programme about 5% to 7% yearly to meet the requirements of the employers *[Exh. 11.21: Meetings and feedback of Alumni]*.

PART III: STRENGTHS AND WEAKNESSES ANALYSIS

1. Criterion 1: Expected Learning Outcomes

Strengths

- The ACET programme is designed following the ISO procedure of HCMUTE and the ACET programme is benchmarked to programmes of famous national and international universities.
- The ELOs of the programme are developed focusing on the hands-on experience, technology, and research to meet stakeholders' needs by qualified academic lecturers whose expertise are in engineering, science, education, practical experience and professional support staffs.
- The contents of the ACET programme are designed for students who can continue to study in higher degrees, to work in the academia and industry.

Weakness

- Although the surveys are sent to many companies, just feedback from companies who have a good relationship with university/faculty are received, it will affect to the designed ELOs of the programme. This is a common situation of Vietnamese universities.

Opportunities

- With the Fourth Industrial Revolution, the demand for human resources in this automation and control field for companies and factories is very large. Therefore, the programme can become a standard and have a large impact on the society.
- The ACET programme and other programmes of FEEE have received strong support from the HCMUTE and companies for many recent years.

Threats

- The competition of high-quality human resources in the automation and control field for graduates of ACET programme with other universities in ASEAN Economic Community (AEC).
- For international students, it is difficult to select this ACET programme since not many courses are lectured in English.

Plans for improvement

- Improve the lecturers' English ability by attending oversea programmes as well as attracting young and ambitious lecturers with high quality.
- Develop additional CLOs that help improve the ACET based on the feedback from more stakeholders.
- Co-operate with national and international universities to put actions together in student exchange.
- Collaborations with companies for better internship.

2. Criterion 2: Programme Specification

Strengths

- The ACET programme specification has reflected the educational philosophy, vision, and mission of the HCMUTE and FEEE.
- The programme specification provides clear information for students and other stakeholders through websites of the department, FEEE and AAO, student handbook and poster. Any change of the programme is always announced to stakeholders.
- Courses in the programme are divided into core and elective courses to create the solid and common background as well as increase flexibility so that students have favorite selections for new orientations.

Weakness

- The development of new technology will require high-quality workforce, especially in automation and control field. Thus, the ACET programme is required to continuously improve to adapt to the social needs.

Opportunities

- Currently, many national and international universities have a very good collaboration and contribution to HCMUTE and to this programme.
- The needs of the workforce in the automation and control field are increasing thus students have many opportunities to work in both the academia and industry.

Threats

- Most of the laboratories are suitable for training and research. Laboratories for high quality research to fulfill new requirements of the technology trends need to be improved continuously.

Plans for improvement

- Enhance the collaboration between faculty/department with companies to solve real problems from industry and technology transfer.
- Improve the quality of lecturers in the department in research and training by offering them more advanced courses through BUILD-IT, COMET, ITEC programs, and others.

3. Criterion 3: Programme Structure and Content

Strengths

- Structure of ACET programme is designed with good balance between theoretical and practical knowledge.
- Project-based learning is applied in the designing process of project courses to help students develop their necessary soft skills for solving problems.
- The order and prerequisites of the courses are shown to help students choose the appropriate courses.

Weakness

- Most of the lectures are delivered in Vietnamese, lack of lecturers with higher qualifications in English to help students improve English skills.

Opportunities

- The introduction to ACET course is added in the first school year to equipt soft skills and encourage students to discover their future careers.
- Master programme in ACET has recruited students since 2015 for graduates from ACET programme to continue their further study.

Threats

- Many programmes in other universities relating to this field are expanding and developing to compete to the ACET programme.

Plans for improvement

- To improve the English skills for students, lecturers are required to gain English level by attending English classes from university/department and deliver more lecturers in English.
- Department plans to equip new devices to help students be familiar with real devices in the industry.

4. Criterion 4: Teaching and Learning Approach

Strengths

- Most lecturers who are Ph.D. holders graduated abroad have good experience in teaching and research activities.
- TAs can help lecturers and students improve teaching and learning activities.
- Courses are designed to link between the theory and the practice such as theoretical courses, practical courses, projects, and thsis in sequence.

Weakness

- Some lecturers are focusing more on teaching than researching and guiding students in scientific research.

Opportunities

- Many good supporting policies for lecturers from HCMUTE and department for teaching and research work.
- The quality of entry students is improved every year that will improve the quality of training process.

Plans for improvement

- Encourage young lecturers to go abroad to improve their knowledge and skills to adapt to the new trend of technology.

5. Criterion 5: Student Assessment

Strengths

- The student assessments are applied for all courses based on the ISO procedure. The student assessments include formative and summative assessments. In which, both soft-skill and technical knowledge are assessed.
- Some training courses enhance student assessments for reliability and fairness using rubrics.

Weakness

- Some lecturers are only focusing on knowledge assessment rather than skills assessment.

Opportunities

- Students and lecturers are cooperative. Thus, lectures can adjust their teaching and learning methods for improving the educational quality.

Plans for improvement:

- The department will establish the Academic Standing Committee to follow up student progress more systematically.
- Improve more courses using online assessments.

6. Criterion 6: Academic Staff Quality

Strengths

- Most lecturers of the Department have practical experience in teaching students since most of them have more than five years of experience in teaching.
- A majority of lecturers are active, enthusiastic, and graduated from countries such as Japan, Australia, Korea, and Taiwan, and others. They are passionate about scientific research and have published publications on national and international journals.

- Lecturers always apply and update various active teaching methods to enhance teaching performance.
- Lecturers use the LMS page for online teaching.

Weakness

- Eleven lecturers in the Department holds the Associate Professor titles.

Threats

- The demands for collaborations from enterprises are limited by the department and it may run the risk of losing their interests.

Plans for improvement

- Encourage young lecturers to study overseas and achieve higher qualifications.
- Attract appropriate companies to get involved in the ACET programme.
- Create opportunities for lecturers to exchange with professors of overseas universities.
- Encourage lecturers to attend more international conferences.

7. Criterion 7: Support Staff Quality

Strength

- Lecturers who have advanced knowledge and high qualifications, most of them graduated from countries such as Japan, Australia, Korea, and Taiwan, and others.
- The relationship among lectures is solid and friendly and offer mutual help to solve administrative issues.
- The secretaries work hard and maintain the integration within the FEEE and with students.

Weakness

- The English proficiency of the staff needs to be improved.

Opportunities

- HCMUTE has the development strategy for supporting staff. Staff can join courses which are annually organized for the professional training and English studying. Staff members who obtain qualified English certification are awarded.
- HCMUTE provides many scholarships for supporting staff for higher studying.

Plans for improvement

- Give the staff more opportunities to improve their English proficiency, to update the training courses related to technology and for promotion.

8. Criterion 8: Student Quality and Support

Strengths

- Intake students of the ACET programme have high input grades and students are motivated, ambitious, demanding, and active in different aspects. Besides, they are trained in a friendly atmosphere by lecturers and staff.
- Many social activities such as Sports Championship, Blood Donation are annually organized by the Youth Union and Student Association as well as scientific research activities such as LED Circuit Design Contest, and Autonomous Robot Competition, Dancing Robot are annually organized.
- The SSC has clubs such as English, Experience, Sport and students can easily join these clubs to help them with the life and health problems, in which the English club may help them improve the language they may face when writing theses in English.

- HCMUTE deployed many plans and methods to attract students and ensure student input quality, such as using brochures and leaflets to provide information about the university, the programme; besides, the programme is introduced to learners and enterprises via the Student Handbook, website, Open Day, Job Fair, YouTube, and Facebook.
- The academic advisors and administrative staff are able to take over, handle, and consult students and freshmen effectively.

Weakness

- Many students come from different towns, far away from Ho Chi Minh City. It takes time for them to adapt to new living and learning environments.

Opportunities

- The University offers a lot of scholarships to students who have the best GPA and the hard situations. It allows us to attract better students.
- The reputation of the University and the FEEE has been improved year by year.
- The field of ACET provides many opportunities for finding jobs for graduates.

Threats

- Other universities in Vietnam have the ACET field.

Plans for improvement

- Increase collaborations with companies/enterprises for the organization of career orientation days and visiting trips for students to know more about the job and feel more confident in their choice of the ACET field.
- Since many students of HCMUTE come from different provinces, their English competence is at different levels. The university should have several methods to improve their English ability by regularly organizing further English courses.

9. Criterion 9: Facilities and Infrastructure

Strengths

- Most of the laboratories in Automatic Control Department are sponsored by famous companies that fully equipped with modern technologies which enable students to perform the required scientific experiments and transfer theoretical knowledge into practice, which ultimately help students understand and grasp the information.
- The modern facilities and infrastructure of the university, faculty, and department with international/national standard levels meet the teaching, learning, and research activities.

Weakness

- The number of teaching assistant is not enough for all of the laboratories in Automatic Control Department due to high requirements to teaching assistant.

Plans for improvement

- Enhance the cooperation among companies and FEEE for being coherent in consultancy and supports to students.
- The number of self-study and research Labs for lecturers and students will be enlarged.

10. Criterion 10: Quality Enhancement

Strengths

- The Department collects feedback on the programme from stakeholders for enhancement of the training programme. The feedback is taken from alumni, lecturers, and students periodically.

- After finishing courses, lecturers receive feedback from students online to help adjust teaching and assessment methods.
- Lecturers use rubrics to assess in projects, graduation thesis, and labs for enhancement of reliability and fairness.
- Labs, self-study spaces, spaces for sharing, the high-speed Wifi system, websites, and Digital Learning Center have been appropriately invested in recent years.

Weakness

- Since most of the young lecturers are studying abroad for higher qualifications, the remaining lecturers have to teach more classes.

Opportunities

- IR. 4.0 is being interested in Government that attacts more investment for the department to improve the quality of the programme and equipments.
- Lecturers will approach the quality programme for the development of their teaching and research.

Plans for improvement

- The university, faculty, and department will increase collaboration with stakeholders in order to invite them to send feedbacks for timely improving the programme in 2018-2019.
- Rubrics will apply for many courses in 2018-2019 and adjust every year.

11. Criterion 11: Output

Strengths

- Most of graduates have good jobs after three months, especially many graduates apply successfully to graduate programmes in international universities.
- The university has the ISO procedure for monitoring teaching and learning process. This procedure especially supports the improvement of the quality of students' studying process and helps adequate graduation rate of students on time; early graduation from requirements; reduction of late graduation and dropout.

Weakness

- The ACET programme has not attracted foreign students yet, just attracted exchanged students.

Opportunities

- The students are cooperative with other universities.
- The job market is ready for the ACET students.

Threats

- The success of the output depends on the intake students, the reputation, infrastructure, quality, and enthusiasm of the staff.

Plans for improvements

- The department will cooperate with companies to organize more workshops or courses to improve the connection between department and companies
- Increase the time for internship that will give students more opportunities to work with real environment.

Checklist for AUN-QA Assessment at Programme Level

	Criteria	1	2	3	4	5	6	7
1	**Expected Learning Outcomes**							
1.1	The expected learning outcomes have been clearly formulated and aligned with the vision and mission of the university.						√	
1.2	The expected learning outcomes cover both subject specific and generic (i.e. transferable) learning outcomes.						√	
1.3	The expected learning outcomes clearly reflect the requirements of the stakeholders.						√	
	Overall Opinion	**6.0**						
2	**Programme Specification**							
2.1	The information in the programme specification is comprehensive and up-to-date.						√	
2.2	The information in the course specification is comprehensive and up-to-date.						√	
2.3	The programme and course specification are communicated, and made available to the stakeholders.					√		
	Overall Opinion	**6.0**						
3	**Programme Structure and Content**							
3.1	The curriculum is designed based on constructive alignment with the expected learning outcomes.						√	
3.2	The contribution made by each course to achieve the expected learning outcomes is clear.						√	
3.3	The curriculum is logically structured, sequenced, integrated, and up-to-date.					√		
	Overall Opinion	**6.0**						
4	**Teaching and Learning Approach**							
4.1	The educational philosophy is well articulated and communicated to all stakeholders.						√	
4.2	Teaching and learning activities are constructively aligned to the achievement of the expected learning outcomes.						√	
4.3	Teaching and learning activities enhance life-long learning.						√	
	Overall Opinion	**6.0**						
5	**Student Assessment**							
5.1	The student assessment is constructively aligned to the achievement of the expected learning outcomes.						√	
5.2	The student assessments including timelines, methods, regulations, weight distribution, rubrics, and grading are explicit and communicated to students.					√		
5.3	Methods including assessment rubrics and marking schemes are used to ensure validity, reliability, and fairness of student assessment.					√		
5.4	Feedback of student assessment is timely and helps to improve learning.					√		
5.5	Students have ready access to appeal procedure.						√	
	Overall Opinion	**5.0**						
6	**Academic Staff Quality**							
6.1	Academic staff planning (considering succession, promotion, re-deployment, termination, and retirement) is carried out to fulfill the needs for education, research, and service.					√		

6.2	Staff-to-student ratio and workload are measured and monitored to improve the quality of education, research, and service.					√		
6.3	Recruitment and selection criteria including ethics and academic freedom for appointment, deployment, and promotion are determined and communicated.						√	
6.4	Competencies of academic staff are identified and evaluated.					√		
6.5	Training and developmental needs of academic staff are identified and activities are implemented to fulfill them.						√	
6.6	Performance management including rewards and recognition is implemented to motivate and support education, research, and service.					√		
6.7	The types and quantity of research activities by academic staff are established, monitored and benchmarked for improvement.					√		
	Overall Opinion	**5.0**						
7	**Support Staff Quality**							
7.1	Support staff planning (at the library, laboratory, IT facility, and student services) is carried out to fulfill the needs for education, research and service.						√	
7.2	Recruitment and selection criteria for appointment, deployment, and promotion are determined and communicated.						√	
7.3	Competencies of support staff are identified and evaluated.					√		
7.4	Training and developmental needs of support staff are identified and activities are implemented to fulfill them.						√	
7.5	Performance management including rewards and recognition is implemented to motivate and support education, research, and service.					√		
	Overall Opinion	**6.0**						
8	**Student Quality and Support**							
8.1	The student intake policy and admission criteria are defined, communicated, published, and up-to-date.						√	
8.2	The methods and criteria for the selection of students are determined and evaluateded.					√		
8.3	There is an adequate monitoring system for student progress, academic performance, and workload.						√	
8.4	Academic advice, co-curricular activities, student competition, and other student support services are available to improve learning and employability.					√		
8.5	The physical, social and psychological environment is conducive for education and research as well as personal well-being.						√	
	Overall Opinion	**6.0**						
9	**Facilities and Infrastructure**							
9.1	The teaching and learning facilities and equipment (lecture halls, classrooms, project rooms, etc.) are adequate and updated to support education and research.						√	
9.2	The library and its resources are adequate and updated to support education and research.					√		
9.3	The laboratories and equipment are adequate and updated to support education and research.					√		
9.4	The IT facilities including e-learning infrastructure are adequate and updated to support education and research.					√		

9.5	The standards for environment, health and safety; and access for people with special needs are defined and implemented.					√		
	Overall Opinion	**5.0**						
10	**Quality Enhancement**							
10.1	Stakeholders' needs and feedback serve as input to curriculum design and development.						√	
10.2	The curriculum design and development process are established and subjected to evaluation and enhancement.					√		
10.3	The teaching and learning processes and student assessment are continuously reviewed and evaluated to ensure their relevance and alignment.						√	
10.4	Research output is used to enhance teaching and learning.					√		
10.5	Quality of support services and facilities (at the library, laboratory, IT facility, and student services) is subjected to evaluation and enhancement.						√	
10.6	The stakeholders' feedback mechanisms are systematic and subjected to evaluation and enhancement.						√	
	Overall Opinion	**5.0**						
11	**Output**							
11.1	The pass rates and dropout rates are established, monitored and benchmarked for improvement.						√	
11.2	The average time to graduate is established, monitored and benchmarked for improvement.						√	
11.3	Employability of graduates is established, monitored, and benchmarked for improvement.					√		
11.4	The types and quantity of research activities by students are established, monitored and benchmarked for improvement.					√		
11.5	The satisfaction levels of stakeholders are established, monitored and benchmarked for improvement.						√	
	Overall Opinion	**6.0**						
	Final Opinion	**5.5**						

PART IV: APPENDICES

Appendix 1: ACET programme specification

Training major: Automation and Control Engineering Technology

Training level: Bachelor

Major code: 52510303

1. Awarding institution:

HCMC University of Technology and Education

2. Name of the final award:

Bachelor of Engineering (in Automation and Control Engineering Technology)

3. Mode of study: Full time

Type of study: Campus-based

4. Training time:

The normal period of study for a full-time bachelor's degree is four years and the maximum period is eight years.

5. Admission criteria:

High school graduate candidates have total score of Mathematics, Physics, and Chemistry (group A) or Mathematics, Physics, and English (group A1), or Mathematics, Literature, English (group D1) in an annual National High School Graduation Examination held in July by MOET higher than the cut-off score set by the HCMUTE based on the student admission quota from MOET. The cut-off score will be published in August. Candidates, who graduated from specialized high schools, have an average score of five consecutive terms of high school larger than 7.5 and are in the top 10% of the HCMUTE annual admission quota.

6. Programme Expected Objectives:

PEO-01	Effectively utilize fundamental mathematics, scientific, and engineering technology principles together with modern tools in solving automation and control engineering problems. (ELO-1.1, ELO-1.2, ELO-1.3).
PEO-02	Have self-confidence in technical and management skills, roles of responsibility in professional activities, participating effectively in multidisciplinary teams and appreciate the importance of life-long learning. (ELO-2.1, ELO-2.2, ELO-2.3, ELO-2.4, ELO-2.5)
PEO-03	Adapt effectively in the professional environment, leadership, and teamwork in the context of automation and control engineering to fulfill the needs of society. (ELO-3.1, ELO-3.2, ELO-3.3).
PEO-04	Apply this knowledge and skills via professional activities and training to design, development, and manufacturing of automation and control engineering technology fields. (ELO-4.1, ELO-4.2, ELO-4.3, ELO-4.4, ELO-4.5, ELO-4.6).

7. Reference points used to inform the programme specification:

The CDIO-based education that engineering graduates should be able to Conceive – Design – Implement – Operate engineering systems and stakeholders' surveys.

8. Expected learning outcomes:

ELO-1.1	An ability to apply knowledge of mathematics, science, information technology, and engineering.
ELO-1.2	An ability to analyze the fundamental knowledge of automation and control engineering.
ELO-1.3	An ability to analyze advanced knowledge of automation and control engineering.
ELO-2.1	An ability to analyze and solve the problems of the automation and control engineering field.
ELO-2.2	An ability to identify, formulate and solve engineering problems to design a system, component, or process to meet desired needs.
ELO-2.3	An ability to select possible solutions for automation and control engineering within the context of society, enterprise, and technique.
ELO-2.4	A recognition of the importance of the global, economic, environmental and societal context in automation and control engineering to engage in life-long learning.
ELO-2.5	An ability to perceive professional practice skills in automation and control engineering including professional and ethical responsibility.
ELO-3.1	An ability to evaluate the goals and characteristics of individuals to engage technical collaboration with team members in multi-disciplinary projects.
ELO-3.2	An ability to select various communication skills in both technical and none technical environments.
ELO-3.3	An ability to demonstrate the capacity to use English in automation and control engineering with the emphasis on reading and writing skills.
ELO-4.1	An ability to judge the impact of automation and control engineering solution in global, economic, environmental, and societal context, and vice versa.
ELO-4.2	An ability to adapt different enterprise and business cultures and develop professional behaviors to achieve the success.
ELO-4.3	An ability to propose appropriate systems in the automation and control field to match the realistic demands.
ELO-4.4	An ability to use the techniques, skills, and modern engineering tools to design a part or complete of the automation and control systems.
ELO-4.5	An ability to participate effectively in the development, organization, operation, and management of automation and control projects.
ELO-4.6	An ability to operate the automation and control systems in the factory including inspection, maintenance, repair, and upgrade.

9. Block of knowledge

Name	**Credits**		
	Total	**Compulsion**	**Elective**
General knowledge	**56**	**45**	**11**
Political Education	12	12	0
Social Science	6	0	6
English	9	9	0
Mathematics and Natural Sciences	23	18	5
Informatics	3	3	0
Introduction to ACET	3	3	0

Professional knowledge	94	88	6
Broad knowledge for the group of majors and deep knowledge for the major	37	37	0
Specialized knowledge	27	21	6
Practice and Internship	20	20	0
Graduation Thesis	10	10	0

10. Program contents

a. General knowledge: 56 Credits

No.	Code	Course name	Credits	Note
A	**Political Education and General Laws**		**12**	
1	LLCT150105	Principles of Marxist-Leninism	5	
2	LLCT120314	Ho Chi Minh's Ideology	2	
3	LLCT230214	Vietnamese Communist Party Policy of Revolution	3	
4	GELA220405	General Laws	2	
B	**Introduction to ACET**		**3**	
1	IACT130046	Introduction to ACET	2+1	
C	**Informatics**		**3**	
1	CPRL130064	C Program Language	2+1	
D	**Foreign Language**		**9**	
1	ENGL130137	English 1	3	
2	ENGL230237	English 2	3	
3	ENGL330337	English 3	3	
E	**Mathematics and Natural Sciences**		**23**	
1	MATH130101	Advanced Mathematics 1	3	
2	MATH130201	Advanced Mathematics 2	3	
3	MATH130301	Advanced Mathematics 3	3	
4	MATH130401	Applied Probability	3	
5	PHYS120102	Fundamental Physics A1	3	
6	PHYS120202	Fundamental Physics A2	2+1	
7	MATH121201	Complex Functions and Laplace Transforms	2	
8	GCHE130103	Fundamental Chemistry A1	3	
F	**Social Science (*choose 03 among the 11 courses*)**		**6**	
1	GEEC220105	General Economics	2	
2	PLSK320605	Planning Skill	2	
3	INMA220305	Introduction to Management	2	
4	INSO321005	Introduction to Sociology	2	
5	IQMA220205	Introduction to Quality Management	2	
6	INLO220405	Introduction to Logic	2	
7	PRSK320705	Presentation Skills	2	
8	SYTH220505	Systems Thinking	2	
9	ULTE121105	University Learning Method	2	
10	IVNC320905	Vietnamese Culture	2	
11	TDTS320805	Technical Writing	2	

G	**Physical Education**		**5**	
1	PHED110513	Physical Education 1	1	
2	PHED110613	Physical Education 2	1	
3	PHED130715	Physical Education 3 (compulsory)	3	
H	**National Defense Education**		**11**	

b. Professional education knowledge: 94 credits

No.	Code	Subject's name	Credits	Note
A	**Electrical and Electronics Core**		**25**	
1	ELCI140144	Electric Circuit	4	
2	BAEL340662	Basic Electronics	4	
3	DIGI330163	Digital Systems	3	
4	EMIN330244	Electrical Measurement and Instruments	3	
5	MICR330363	Microprocessor	3	
6	ELSA320245	Electrical Safety	2	
7	POEL330262	Power Electronics	3	
8	ACSY330346	Automatic Control Systems	3	
B	**Electrical and Electronics Advanced Core**		**9**	
1	ELMA240344	Electrical Machines	4	
2	MASC220146	Modeling and Simulation using Computer	2	
3	ELDR320545	Automatic Electric Drive	3	
C	**Automation and Control Area Core**		**21**	
1	PLCS330846	Programmable Logic Controller	3	
2	ROBO320246	Robotics	3	
3	EEPN320446	Electrical Equipment and Pneumatics	2	
4	ELPS330345	Electrical Power System	3	
5	SCDA420946	Data acquisition system and SCADA	2	
6	DPLC431046	Data Transmission and PLC Networks	3	
7	AACS320546	Advance Automatic Control Systems	2	
8	PRTO412446	Professional Development Topics	1	
9	MCPR310646	Project 1	1	
10	ARPR310746	Project 2	1	
11	PLCR311146	Project 3	1	
D	**Automation and Control Area Electives**		**6**	
1	INCO321546	Intelligent control	2	
2	EMSY427764	Embedded Systems	2	
3	CADA321646	CAD in ACET	2	
4	IDMA322245	Industry management	2	
5	IMPR322046	Industrial Image Processing	2	
E	**Practice and Internship**		**20**	
1	ELPR210644	Electric in Practice	1	

2	ELPR320762	Basic Electronics in Practice	2	
3	PMEM310844	Measurement Engineering in Practice	1	
4	PRDI320263	Digital Systems in Practice	2	
5	PRMI320463	Microprocessor in Practice	2	
6	PREM221244	Electric Machine in Practice	2	
7	POEP320262	Power Electronics in Practice	2	
8	PPLC321346	Programmable Logic Controller in Practice	2	
9	ROPR311246	Robotic in Practice	1	
10	ELEC322645	Electric Drive in Practice	2	
11	PACS321446	Automatic Control Systems in Practice	1	
12	ININ422346	Internship	2	
F	**Graduation Thesis**		**10**	
1	FIPR4102546	Graduation Thesis	10	

11. Teaching plan

Semester	No.	Code	Course Name	Credit		
				Theory	Practice	Total
1	1	IACT130046	Introduction to ACET	2	1	3
	2	CPRL130064	C Program Language	2	1	3
	3	ENGL130137	English 1	3	0	3
	4	MATH130101	Advanced Mathematic A1	3	0	3
	5	MATH130201	Advanced Mathematic A2	3	0	3
	6	PHYS130102	Fundamental Physics A1	2	1	3
	7	GCHE130103	Fundamental Chemistry A1	3	0	3
	8	PHED110513	Physical education 1	1	0	1
Total credits in Semester 1						**22**
2	9	LLCT150105	Fundamental Principles Marxism – Leninism	5	0	5
	10	ENGL230237	English 2	3	0	3
	11	MATH130301	Advanced Mathematic A3	3	0	3
	12	MATH121201	Complex Variable Functions & Laplace Transforms	2	0	2
	13	PHYS120202	Fundamental Physics A2	2	1	2
	14	PHYS110302	Physics Experiment	0	1	1
	15	PHED110613	Physical Education 2	1	0	1
	16	ELCI140144	Electric Circuit	4	0	4
Total credits in Semester 2						**21**
3	17	ENGL330337	English 3	3	0	3
	18	ELSA320245	Electrical Safety			2
	19	MATH130401	Applied Statistics Probability	3	0	3

	20	ELMA240344	Electrical Machines	4	0	4
	21	GELA220405	General Law	2	0	2
	22	SISY330164	Signals and Systems	3	0	3
	23	BAEL340662	Basic Electronics	4	0	4
	24	EMIN330244	Electrical Measurement and Instruments	3	0	3
	25	PHED130715	Physical Education 3	3	0	3
	26	ELFI220344	Electromagnetic Field	2	0	2
	27	ELEQ220944	Electrical Equipment	2	0	2
Total credits in Semester 3						**24**
4	28	LLCT120314	Ho Chi Minh's ideology	2	0	2
	29	DIGI330163	Digital Systems	3	0	3
	30	DACO430664	Data Communication	3	0	3
	31	POEL330262	Power Electronics	3	0	3
	32	ELPS330345	Power Supply System	3	0	3
	33	ACSY330346	Automatic Control Systems	3	0	3
	34	ELPR320762	Basic Electronics in Practice	0	2	2
	35	PMEM310844	Measurement Engineering in Practice	0	1	1
	36	ELPR210644	Electric in Practice	0	1	1
Total credits in Semester 4						**21**
5	37	LLCT230214	Vietnamese Communist Party Policy of Revolution	3	**0** 0	3
	38	ELDA323245	Electric Drive and Application	2	0	2
	39	MICR330363	Microprocessor	3	0	3
	40	ROBO320246	Robotics	2	0	3
	41	MASC220146	Modeling and Simulation using Computer	2	0	2
	42	AACS320546	Advance Automatic Control Systems	2	0	2
	43	MCPR310646	Project 1	1	0	1
	44	PREM221244	Electric Machine in Practice	0	2	2
	45	PRDI320263	Digital Systems in Practice	0	2	2
	46	PACS321446	Automatic Control Systems in Practice	0	1	1
Total credits in Semester 5						**21**
6	47	EEPN320446	Electrical Equipment and Pneumatics	2	03	2
	48	PLCS330846	Programmable Logic Controller	3	0	3
	49	ARPR310746	Project 2	1	0	1

	50	ROPR311246	Robotic in Practice	0	1	1
	51	POEP320262	Power Electronics in Practice	2	0	2
	52	PRMI320463	Microprocessor in Practice	0	2	2
	Electives (6 Credits)					
	53	GEEC220105	General Economics	2	0	2
	54	INSO321005	Introduction to Sociology	2	0	2
	55	IQMA220205	Introduction to Quality Management	2	0	2
	56	INMA220305	Introduction to Management	2	0	2
	57	IVNC320905	Vietnamese Culture	2	0	2
Total credits in Semester 6						**17**
7	58	SCDA420946	Data Acquisition System and SCADA	2	0	2
	59	DPLC431046	Data Transmission and PLC Networks	3	0	3
	60	PLCR311146	Project 3	1	0	1
	61	ELEC322645	Electric Drive in Practice	0	2	2
	62	PPLC321346	Programmable Logic Controller in Practice	0	2	2
	Electives (6 Credits)					
	63	INCO321546	Intelligent Control	2	0	2
	64	EMSY427764	Embedded Systems	2	0	2
	65	CADA321646	CAD in ACET	2	0	2
	66	IDMA322245	Industry Management	2	0	2
	67	IMPR322046	Industrial Image Processing	2	0	2
Total credits in Semester 7						**16**
8	68	ININ422346	Internship	0	2	2
	69	PRTO412446	Professional Development Topics	1	0	1
	70	FIPR4102546	Graduation Thesis	0	10	10
Total credits in Semester 8						**13**

12. Progression point

Students have to obtain a score of 5.0 out of 10.0 for all courses. If ACET student cannot match the progression requirements of HCMUTE (A minimum cumulative GPA of 3.0 for the first year, or 3.5 for the second year, or 4.0 for the third year or 4.5 from the fourth year or over allowable study time), then he/she is required to quit from the programme.

13. Job opportunities

After graduation, ACET students have opportunities to work in many fields as follows:

- ACET students can work in the Research and Development Section related to automation and control engineering technology such as designing the automation system, developing the automation applications for industry and routine life.

- ACET students can work in the manufacturing factories in which they will be in charge of the production lines and machines. They can work in the maintenance section for repairing and maintaining the machines.
- They have chances to work in the sale, service and training fields which are related to automation and control engineering technology.

14. Issued and revised date

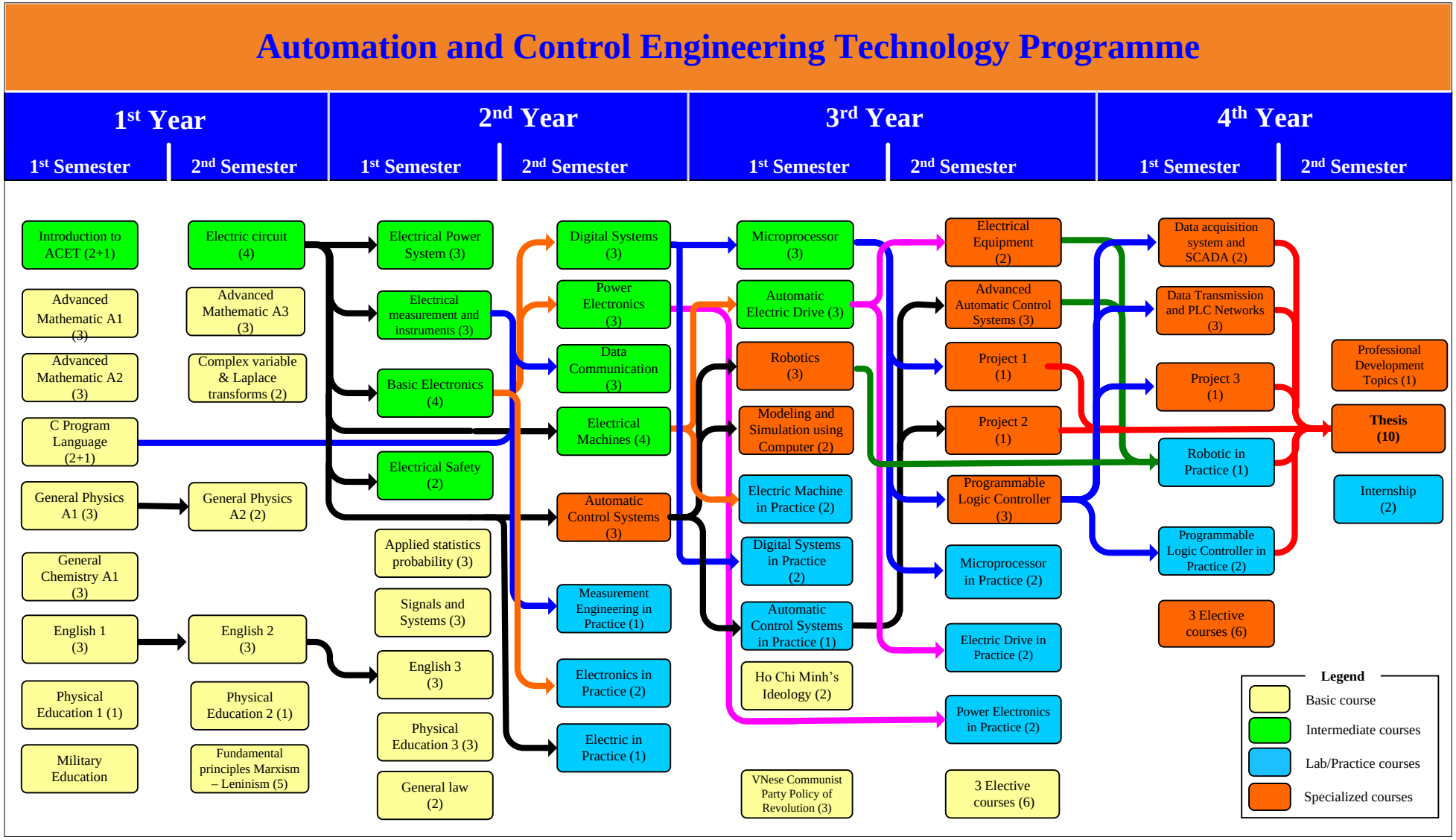
The programme was issued in July 2012 and last revised in 2014 and 2016.

Appendix 2: Relationships between courses and ELOs of ACET programme

Semester	Course Name	ELOs																
		1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5	3.1	3.2	3.3	4.1	4.2	4.3	4.4	4.5	4.6
1	Introduction to ACET	✓					✓	✓	✓	✓	✓	✓						
	Advanced Mathematics A1	✓			✓			✓	✓	✓	✓							
	Advanced Mathematics A2	✓			✓			✓	✓	✓	✓							
	C Program Language	✓			✓			✓										
	General Physics A1	✓			✓					✓								
	General Chemistry A1	✓			✓						✓							
	English 1	✓								✓		✓						
	Physical education 1							✓		✓								
2	Electric circuit	✓	✓			✓										✓		
	Advanced Mathematics A3	✓			✓			✓	✓	✓	✓							
	Complex variable functions & Laplace transforms	✓	✓															
	General Physics A2	✓			✓					✓								
	English 2	✓								✓		✓						
	Physics experiment	✓				✓		✓		✓	✓							
	Physical education 2							✓		✓								
	Fundamental principles Marxism – Leninism	✓							✓	✓			✓	✓				
3	Power Supply System	✓	✓		✓	✓					✓	✓						
	Electrical measurement and instruments	✓	✓			✓					✓		✓					✓
	Basic Electronics	✓	✓			✓						✓				✓		
	Electrical Safety	✓	✓		✓	✓					✓	✓						
	Applied statistics probability	✓							✓	✓			✓	✓				
	English 3	✓								✓		✓						
	Physical education 3							✓		✓								
	Signals and Systems	✓	✓	✓		✓						✓			✓		✓	
	General law	✓							✓	✓	✓							
4	Digital Systems	✓	✓		✓	✓	✓					✓						
	Power Electronics	✓	✓		✓	✓					✓							
	Data Communication	✓	✓			✓					✓							
	Electrical Machines	✓	✓		✓	✓				✓								
	Automatic Control Systems	✓	✓			✓	✓					✓			✓			
	Measurement Engineering in Practice	✓	✓	✓	✓													✓
	Basic Electronics in Practice	✓	✓			✓				✓	✓	✓			✓	✓		
	Electric in Practice	✓	✓			✓			✓									✓
5	Microprocessor	✓	✓		✓	✓					✓	✓						
	Automatic Electric Drive	✓	✓			✓				✓	✓		✓	✓				✓
	Robotics	✓	✓		✓											✓		

	Modeling and Simulation using Computer	✓	✓		✓	✓				✓	✓	✓				✓	✓	
	Electric Machine in Practice	✓	✓		✓	✓				✓	✓	✓						✓
	Digital Systems in Practice	✓	✓	✓	✓	✓									✓	✓		
	Automatic Control Systems in Practice	✓	✓		✓	✓	✓		✓	✓	✓	✓			✓			
	Ho Chi Minh's ideology	✓						✓	✓	✓	✓							
	Vietnamese Communist Party Policy of Revolution	✓							✓	✓	✓		✓					
6	Electrical Equipment and Pneumatics	✓	✓		✓	✓					✓					✓		
	Advance Automatic Control Systems	✓		✓	✓				✓	✓	✓	✓			✓	✓	✓	
	Project 1	✓	✓	✓	✓	✓		✓		✓		✓	✓	✓	✓	✓		
	Project 2	✓	✓	✓	✓	✓		✓		✓		✓	✓	✓	✓	✓		
	Programmable Logic Controller	✓	✓			✓	✓			✓		✓				✓		
	Microprocessor in Practice	✓	✓	✓	✓	✓					✓					✓		
	Electric Drive in Practice	✓	✓		✓			✓	✓	✓	✓	✓	✓	✓				✓
	Power Electronics in Practice	✓	✓	✓	✓	✓										✓		
	Electives (6 Credits) in Economics and Society																	
7	Data acquisition system and SCADA	✓	✓	✓						✓		✓				✓		
	Data Transmission and PLC Networks		✓	✓	✓	✓				✓	✓	✓				✓	✓	✓
	Project 3	✓	✓	✓	✓	✓		✓		✓		✓	✓	✓	✓	✓		
	Robotic in Practice	✓														✓	✓	
	Programmable Logic Controller in Practice	✓	✓	✓	✓	✓									✓	✓		
	Electives (6 Credits)																	
	Intelligent Control	✓	✓		✓	✓	✓									✓		
	Embedded Systems	✓	✓	✓		✓					✓					✓		
	CAD in ACET	✓	✓	✓		✓									✓	✓		
	Industry Management	✓	✓	✓			✓		✓	✓	✓	✓						
	Industrial Image Processing	✓	✓	✓	✓	✓			✓	✓								
8	Professional Development Topics	✓	✓	✓	✓	✓			✓	✓	✓		✓					
	Internship	✓	✓	✓	✓	✓			✓		✓		✓					✓
	Graduation Thesis (Final Thesis)	✓	✓	✓	✓	✓			✓		✓	✓			✓	✓		

Appendix 3: Curriculum map



Appendix 4: Rubrics for course assessment

HCM CITY UNIVERSITY OF TECHNOLOGY AND EDUCATION
FACULTY OF ELECTRICAL AND ELECTRONICS ENGINEERING
AUTOMATIC CONTROL DEPARTMENT

RUBRIC FOR GRADUATION THESIS ASSESSMENT

Full name: …… Student ID:……..

Criterion 1: The difficulty of the topic (10%)					***Marks***
2	**4**	**6**	**8**	**10**	
Easy	Moderate	A little difficult	Difficult	Very difficult	
Criterion 2: applicability in reality (10%)					
2	**4**	**6**	**8**	**10**	
Inapplicability	Low applicability	Applicability	High applicability	Very high applicability	
Criterion 3: research methodology (10%)					
2	**4**	**6**	**8**	**10**	
Unsuitable	Suitable methodology but unclear	Suitable, clear methodology.	Suitable, clear methodology but not effective	Suitable, clear, logical and effective methodology.	
Criterion 4: Solution, implementation/simulation system (15%)					
3	**6**	**9**	**12**	**15**	
Unclear solutions Uncompleted model and poor simulation	Simple solutions Uncompleted model Good simulation	Good solutions, completed model but does not work Good simulation	Good solutions, completed model can operate the Good simulation	Good solutions, completed model can operate correctly and stable, Good simulation	
Criterion 5: Presenting content (15%)					
3	**6**	**9**	**12**	**15**	
Unclear and careless, poor contents	Poor contents	Good structure and content, careless writing.	Clear structure, good content, careful writing.	Good content, clear structure, easily understand, logical, following the format of the thesis.	
Criterion 6: Presentation (10%)					
2	**4**	**6**	**8**	**10**	
Poor	Average	Good	Very good	Excellent	
Criterion 7: Answer the questions of committee members (30%)					
6	**12**	**18**	**24**	**30**	
Answer less than 20 percent of all questions	Answer from 20% to 40% of all questions	Answer from 40% to 60% of all questions	Answer from 60% to 80% of all questions	Answer all questions	
Total					

HCM City, Date…. Month…. Year 201…

Student's signature **Lecturer's signature**

THE SOCIALIST REPUBLIC OF VIETNAM

Independent – Freedom – Happiness

Ho Chi Minh City, Date ……. Month …… Year ……

INTERNSHIP ASSESSMENT

To: Automatic Control Department, Faculty of Electrical and Electronics Engineering, Ho Chi Minh City University of Technology and Education.

Company supervisor (*full name*):……..

Cellphone:……Email:……..

Position:…….

Company name:…….

Address:……. ……..……..

……

This internship assessment for:

Student name:……Student ID:..……..

Contact address: …….…….

Faculty: Electrical and Electronics Engineering

Internship duration: From (*dd/mm/yyyy*)…….……to (*dd/mm/yyyy*) …….…….

Internship contents:

1. Implemented tasks during internship:

   …….…….…….…….
   …….…….…….…….
   …….…….
   …….…….…….…….

2. Working attitudes:

   …….…….…….…….
   …….…….…….…….
   …….…….
   …….…….…….…….

3. Required improvement points:

   …….…….…….…….
   …….…….…….…….
   …….…….
   …….…….…….…….

   Mark ..…./10. *(in the word)* ……

Company supervisor

(Signature, Company stamp)

Appendix 5: Sample of a course syllabus

HCMC UNIVERSITY OF TECHNOLOGY AND EDUCATION

Faculty of Electrical and Electronic Engineering

Department of Automatic Control

AUTOMATION AND CONTROL ENGINEERING TECHNOLOGY

Level: Undergraduate

SYLLABUS

1. **Course name:** Introduction to Automation and Control Engineering Technology
2. **Course code:** IACT130046
3. **Credits:** 3 (2/1/4)

   Duration: 15 weeks (30 hrs. lecture, 15 hrs. lab, and 60 hrs self-study)
4. **Instructors:**

   1- Le Chi Kien, Assoc. Prof., PhD

   2- Truong Dinh Nhon, Assoc. Prof., PhD
5. **Course conditions**

   Prerequisites: N/A

   Corequisites: N/A
6. **Course description**

This course is designed to introduce basic concepts in automation and control engineering in an integrated manner; to motivate basic concepts in the context of real applications; to illustrate a logical way of thinking about problems and their solutions, and to convey the excitement of the profession. These goals are attained through analysis, construction, and testing of an electromechanical system that incorporates concepts from a broad range of areas within electrical & electronics engineering. This course also introduces students to the profession, including the disciplines of electrical environmental engineering. Prepares students for success through the integration of the following important skills: presentation, teamwork, ethical decision-making, and communicating with diverse audiences.

7. **Course Goals**

Goals	***Goal description*** *(This course provides students)*	**ELOs**
G1	Implement proficiently professional skills in the automation and control field	3.2
G2	Realize the roles and responsibility of engineers and social circumstance which has impacts on the technical activities of automation and control industry	2.4, 2.5
G3	Comprehend business culture, work ethics principles, and working style of industrial organizations	4.2

8. **Course Learning Outcomes (CLOs)**

CLOs	***Description*** *(After completing this course, students can have:)*	**Outcome**

G1	G1.1	Students will recognize the importance of oral, written, and general professional skills, including teamwork where appropriate	3.2
G2	G2.1	Students will become aware that they are part of a community of learners with whom they can share ideas and common interests	2.4
	G2.2	Students will understand college-level expectations about their academic performance and their personal conduct	2.5
G3	G3.1	Students will become familiar with the HCMUTE, the Faculty of Electrical and Electronics Engineering (FEEE) and the various departments within the FEEE	4.2
	G3.2	Students will know accepted standards of academic ethics and can list important academic values	4.2

9. Study materials

- Textbooks

[1] Saeed Moaveni, Engineering Fundamentals: An Introduction to Engineering, 4th Edition, Cengage Learning, 2011

- References

[2] Elizabeth A. Stephan et al., *Thinking Like An Engineer: An Active Learning Approach*, Pearson, 2011

10. Student Assessments

- Grading points: 10
- Planning for student assessment is followed:

Type	Contents	Time	Assessment techniques	CLOs	Rates (%)
Midterm					**50**
Exercise 01	Group working product	Week 4	Presentation	G1.1 G2.2	5
Exercise 02	Presentation skill	Week 5	Case Studies	G1.1	5
Exercise 03	Introduction to the Automation and Control Engineering	Week 7	Quizzes	G2.1 G3.1	5
Exercise 04	Ethics for engineer	Week 10	Discussion	G3.2	5
Exercise 05	Teamwork in class	Week 11	Problem Solving	G2.1	15
Final exam					**50**
Final Exam	Presentation of group product	Week 15	Individual paper assessment	G1 G2.1, G2.2	50

11. Course details:

Week	Contents	CLOs
1	**Chapter 1: Introduction** *(2/0/4)*	
	A/* Contents and teaching methods: (2)* **Contents:** 1.1. Presentation preparing	G1.1

	1.2. Organizing the Presentation Material **Teaching methods:** 1. Traditional lectures using PowerPoint to review basic knowledge of steel structures course, to demonstrate large applications of engineering. A series of diagnostic questions will be also used to estimate students knowledge. 2. Questions	
	***B/* Self-study contents:** *(4)* • Find the common mistakes during the presentation.	
2	**Chapter 1: Introduction** *(2/0/4)*	
	A/* Contents and teaching methods: (2)* **Contents:** 1.3. Writing Your Presentation 1.4. Deciding the Presentation Method **Teaching methods:** • Theoretical lectures with PowerPoint slides • Questions	G1.1
	***B/* Self-study contents:** *(4)* • Methods of presentation writing	
3	**Chapter 1: Introduction** *(2/0/4)*	
	A/* Contents and teaching methods:(2)* **Contents:** 1.5. Working with Visual Aids 1.6. Managing the Presentation Event **Teaching methods:** • Theoretical lectures with PowerPoint slides • Questions	G1.1
	***B/* Self- study contents:** *(4)* • What kind of Visual Aids using in a presentation	
4	**Chapter 1: Introduction** *(2/0/4)*	
	***A/* Contents and teaching methods:** *(2)* **Contents:** 1.7. Coping with Presentation Nerves 1.8. Dealing with Questions **Teaching methods:** • Theoretical lectures with PowerPoint slides • Questions	G1.1
	***B/* Self- study contents:** *(4)* • How to give a question in the presentation	
5	**Chapter 2: Introduction to Automation and Control Engineer** *(2/0/4)*	
	***A/* Contents and teaching methods:** *(2)* **Contents:** 2.1. Commission and duty of an automation and control engineer 2.2. Program outcomes **Teaching methods:** • Traditional lectures using PowerPoint • Questions	G2.1 G2.2
	***B/* Self- study contents:** *(4)* • Commission and duty of an electrical engineer	

6	**Chapter 2: Introduction to Automation and Control Engineer** (2/0/4)	
	***A/* Contents and teaching methods:** *(2)* **Contents:** 2.3. Ethics overview 2.4. Career specification of engineer **Teaching methods:** • Traditional lectures using PowerPoint • Questions	G2.1 G2.2
	***B/* Self-study contents:** *(4)* • Ethic code for an automation and control engineer	
7	**Chapter 2: Introduction to Automation and Control Engineer** (2/0/4)	
	***A/* Contents and teaching methods:** *(2)* **Contents:** 2.5. Engineer safety 2.6. Challenges for automation and control engineer 2.7. The role of automation and control engineer **Teaching methods:** • Traditional lectures using PowerPoint • Questions	G2.1 G2.2
	***B/* Self-study contents:** *(4)* • Challenges for automation and control engineer	
8	**Chapter 3: Challenges for Engineer in the Future** (2/0/4)	
	***A/* Contents and teaching methods:** *(2)* **Contents:** 3.1. Challenges in the new century 3.2. Problem analysis skill **Teaching methods:** • Traditional lectures using PowerPoint • Questions	G2.1 G2.2
	***B/* Self-study contents:** *(4)* • World technology challenges	
9	**Chapter 3: Challenges for Engineer in the Future** (2/0/4)	
	***A/* Contents and teaching methods:** *(2)* **Contents:** 3.3. Personal SWOT 3.4. Criticize method **Teaching methods:** • Traditional lectures using PowerPoint • Questions	G2.1 G2.2
	***B/* Self-study contents:** *(4)* • How to accept a criticism	
10	**Chapter 3: Challenges for Engineer in the Future** (2/0/4)	
	***A/* Contents and teaching methods:** *(2)* **Contents:** 3.5. Persuasion skill 3.6. Stress management skill **Teaching methods:** • Theoretical lectures • Questions	G2.1 G2.2

	***B/* Self-study contents:** *(4)* • How to deal with stress	
11	**Chapter 3: Challenges for Engineer in the Future** (2/0/4)	
	***A/* Contents and teaching methods:** *(2)* **Contents:** 3.7. Contradiction solving 3.8. Lifelong learning skill **Teaching methods:** • Theoretical lectures with PowerPoint slides • Questions	G2.1 G2.2
	***B/* Self-study contents:** *(4)* • Self-study reading skill	
12	**Chapter 4: Teamwork and Report Writing Skill** (2/0/4)	
	***A/* Contents and teaching methods:** *(2)* **Contents:** 4.1. Teamwork skill **Teaching methods:** • Traditional lectures using PowerPoint • Questions	G1.1
	***B/* Self-study contents:** *(4)* • What is successful and bad teamwork	
13	**Chapter 4: Teamwork and Report Writing Skill** (2/0/4)	
	***A/* Contents and teaching methods:** *(2)* **Contents:** 4.2. Report writing skill 4.3. Thesis writing skill **Teaching methods:** • Traditional lectures using PowerPoint • Questions	G1.1
	***B/* Self-study contents:** *(4)* • Project writing skill	
15	**Chapter 5: Ethics** (2/0/4)	
	***A/* Contents and teaching methods:** *(2)* **Contents:** 5.1. Code of ethics for engineers **Teaching methods:** • Theoretical lectures with PowerPoint slides • Questions	G3.1 G3.2
	***B/* Self-study contents:** *(4)* • Commitment of engineers	
15	**Chapter 5: Ethics** (2/0/4)	
	***A/* Contents and teaching methods:** *(2)* **Contents:** 5.2. NSPE code 5.3. IEEE code **Teaching methods:** • Theoretical lectures with PowerPoint slides • Questions	G3.1 G3.2
	***B/* Self-study contents:** *(4)*	

	• General professional ethics code	

12. Learning ethics:

- Home assignments and projects must be done by the students themselves. Plagiarism found in the assessments will get zero points.

13. First approved date: August 01, 2012

14. Approval level:

Dean	**Department**	**Instructor**
Assoc.Prof. Nguyen Minh Tam, PhD	Assoc.Prof. Truong Dinh Nhon, PhD	Assoc.Prof. Le Chi Kien, PhD

15. Syllabus updated process

1st time: Updated content dated	Instructors
2nd time: Updated content dated	Head of the department

SYLLABUS

1. **Course name:** Programmable Logic Controller
2. **Course code:** PLCS330846
3. **Credits:** 3 (3/0/6)

   Duration: 15 weeks (45h main course and 90h self-study)
4. **Instructors:**

   1- Assoc. Prof. Ph.D. Truong Dinh Nhon

   2- M.Eng. Nguyen Tan Doi

   3- M.Eng. Ta Van Phuong
5. **Course conditions**

   Prerequisites: Digital Systems

   Corequisites: N/A
6. **Course description**

This course provides students the knowledge of the sensors, actuators, PLC hardware, PLC operation. In addition, students will learn the programming languages, PLC instructions, how to design a flowchart for a control system. Finally, the course provides students how to design the hardware and program the software for an industrial system.

7. **Course Goals**

Goals	**Goal description** *(This course provides students:)*	**ELOs**
G1	Basic knowledge of PLC, applications of PLC in industry.	1.1, 1.2
G2	An ability to read material in English.	2.3, 3.3
G3	An ability to work effectively as a member and leader in teams.	3.1
G4	An ability to identify and solve engineering problems and to design an industrial system using tools and methods for solving problems related to PLC systems.	2.2, 4.4

8. **Course Learning Outcomes (CLOs)**

CLOs		***Description*** *(After completing this course, students can have:)*	**Outcome**
G1	G1.1	The ability to present the structure and operation of PLC.	1.1, 1.2
	G1.2	The ability to draw the wiring diagram of PLC and sensors, actuators.	1.1, 1.2
	G1.3	The ability to select devices for the PLC system.	1.1, 1.2
G2	G2.1	The ability to read the manual of devices and lectures in English	2.3, 3.3

G3	G3.1	The ability to organize, work and present in the team.	3.1
G4	G4.1	The ability to present the control ideal for PLC system.	2.2
	G4.2	The ability to use software to program and simulate for PLC.	4.4

9. Study materials

- Textbooks:

[1] Truong Dinh Nhon, Nguyen Tan Doi, Giao trinh Dieu Khien Lap Trinh, 2016.

- References:

[1] Hugh Jack, Automation Manufacturing Systems with PLCs, 2005.

[2] Phan Minh Xuan, Nguyen Doan Phuoc, Tu Dong Hoa Voi SIMATIC S7200, S7300, NXB Nong nghiep, 1999

[3] LA Bryan, Programmable Controller, Industrial Text Company Publication, 1997

10. Student Assessments

- Grading points: 10

- Planning for students assessment is followed:

Type	Contents	Time	Assessment techniques	CLOs	Rates (%)
Midterms					**50**
Exam 01	• Connect DI, DO to switch, push button and lamp in sinking and sourcing types.	Week 3	Teamwork Paper	G1.1, 1.2, G4.1	5
Exam 02	• Addressing Dis, Dos. • Creating Tags. • Select sensors, actuators. • Explain the parameters of a device.	weeks 4, 6, 8, 10	Online Quizzes	G1.1, G1.2, G3.1	5
Exam 03	• Design hardware for PLC system. • Design flowchart. • Program software.	week 11	Individual paper assessment in class	G1.2, G3.2, G4.1	30
Exam 04	• Applications of PLC in industry.	Week 14	Seminar	G4.1, G4.2	10
Final exam					**50**
Final Exam	- The exam covers all contents related to the expected learning outcomes of the course.		Individual paper assessment in class	G1.1, G1.2 G1.3, G2.1 G2.2, G2.3	50

11. Course details

Weeks	Contents	CLOs
1, 2, 3	**Chapter 1: INTRODUCTION TO PLC** (9/0/18) ***A/* Contents and teaching methods***: (9)* **Contents:** 1.1 Basic of PLC. 1.2 Structure of PLC. 1.3 Input and Output circuits of PLC. 1.4 Operation of PLC. 1.5 Comparison of hardware system and PLC system. 1.6 Applications of PLC in industry. **Teaching methods**:	G1.1 G1.2 G2.1 G3.1 G4.1

	Presentation, Theoretical lectures, Video clips, Training software, Teamwork.	
	***B/* Self-study contents**: *(18)* • PLC system. • Drawing diagram of PLC system.	G4.1
4, 5	**Chapter 2: SENSORS AND ACTUATORS** (6/0/12)	
	A/* Contents and teaching methods: (6)* **Contents:** 2.1 Digital sensors. 2.2 Analog sensors. 2.3 Relay and contactor. 2.4 Motors. 2.5 Valve and cylinder. 2.6 Inverter. **Teaching methods**: Presentation, Lectures, Video clips, Teamwork, Online.	G1.3 G3.1 G4.1
	***B/* Self-study contents**: *(12)* • PLC system. • Wiring PNP, NPN sensors and PLC Inputs. • Wiring PLC outputs and relay, contactor. • Wiring PLC and step motor, servo motor, inverter.	G3.1
6, 7	**Chapter 3: PROGRAMMING PLC** (6/0/12)	
	A/* Contents and teaching methods: (6)* **Contents:** 3.1 Design flowchart. 3.2 Programming. 3.3 PLC programming languages. 3.4 Subroutine and interrupt program. **Teaching methods**: Presentation, Theoretical lectures, Teamwork, Online.	G2.3 G4.2
	***B/* Self-study contents**: *(12)* • Programming software. • Using subroutine and interrupt in a PLC program.	G4.2
8, 9, 10	**Chapter 4: PLC INSTRUCTIONS** (9/0/18)	
	A/* Contents and teaching methods: (9)* **Contents:** 4.1 Bit instructions. 4.2 Move instructions. 4.3 Math instructions. 4.4 CMP instructions. 4.5 Timer/Counter instructions. 4.6 Realtime instructions. **Teaching methods**: Presentation, Theoretical lectures, Simulation, Teamwork.	G2.2, 2.3 G4.1, 4.2
	***B/* Self-study contents**: *(18)* • Data memory. • The Instructions Help in programming software.	G4.2
11, 12	**Chapter 5: ACCESSING ANALOG SIGNAL IN PLC** (6/0/12)	
	A/* Contents and teaching methods: (6)* **Contents:** 5.1 Accessing Analog Signal. 5.2 AI Modules and AO Modules. 5.3 Configure AI and AO Modules. 5.4 Scale and Unscale functions. **Teaching methods**:	G2.2, 2.3 G4.1, 4.2

	Presentation, Theoretical lectures, Simulation, Teamwork, Online.	
	***B/* Self-study contents**: *(12)* • Analog to Digital Converter and Digital to Analog Converter. • Wiring analog sensors and AI modules. • Wiring analog actuators and AO modules.	G4.1, 4.2
13, 14, 15	**Chương 6: HIGH-SPEED COUNTER AND PULSE TRAIN OUTPUT** (9/0/12)	
	A/* Contents and teaching methods: (9)* **Contents:** 6.1 Introduction to HSC, PTO, and PWM. 6.2 High-speed counter. 6.3 Pulse train output. 6.4 Applications of HSC and PTO, PWM. 6.5 PLC Communication. **Teaching methods**: Presentation, Lectures, Teamwork	G2.2, G2.3, G4.1, G4.2
	***B/* Self-study contents**: *(18)* • Connect PLC to Encoder and step motor, a servo motor. • PLC networks overview.	G4.1, 4.2

12. Learning ethics:

Home assignments and projects must be done by the students themselves. Plagiarism found in the assessments will get zero points.

13. First approved date: August 1st 2012

14. Approval level:

Dean	Department	Instructor
Assoc.Prof. Nguyen Minh Tam, PhD	Assoc.Prof. Truong Dinh Nhon, PhD	MEng. Nguyen Tan Doi

15. Syllabus updated process

1st time: Updated content dated	Instructors
2nd time: Updated content dated	Head of the department

Appendix 6: List of evidence

No	Exh.	Title of Exhibition	Category
	Criteria 1: Expected Learning Outcomes		
1	1.1	ISO procedures for curriculum development	
	1.1a	ISO procedure for adjusting the annual curriculum	Document
2	1.2	Website of FEEE faculty and department	
	1.2a	The vision and mission of HCMUTE and FEEE	Picture
	1.2b	Website of FEEE faculty and ELOs of ACET program	Document, Picture
3	1.3	Extra activities	
	1.3b	Internship for students	
	1.3a	The decision to organizing social activities for students	
4	1.4	Meeting minute of the Academic Scientific Committee to analyze the ACET ELOs	Document
5	1.5	Workshop evaluating the 2012-year curriculum	Document

No	Exh.	Title of Exhibition	Category
	Criteria 2: Programme Specification		
1	2.1	Program specification	
2	2.2	The minute of meeting of the workshop in 2014 and 2016	Document
	2.2a	ISO procedure for adjusting the annual curriculum	Picture
	2.2b	Department meeting minutes, 2014 and 2016	Document, Picture
	2.2c	FEEE ASC meeting minutes, 2014 and 2016	Document
	2.2d	The meeting minutes of revising the curriculum 2014 and 2016	Document
3	2.3	Sample syllabus and a minute of department meeting for revision of the syllabus	
	2.3a	Sample syllabus	Document, Picture
	2.3b	Minute of department meeting for revision of the syllabus	Picture
4	2.4	Lecturer portfolio and students' feedbacks	Document
	2.4a	Lecturer portfolio	Document
	2.4b	Students' feedbacks	Document
5	2.5	The learning plan announcement for new students	Document
6	2.6	Information of syllabus posted in LMS	Document

No	Exh.	Title of Exhibition	Category
	Criteria 3: Programme Structure and Content		
1	3.1	Student's Handbook	Document
2	3.2	Course syllabus of Introduction to ACET	Document
3	3.3	The decision of attending the MOOCs	Document

No	Exh.	Title of Exhibition	Category
	Criteria 4: Teaching and Learning Approach		
1	4.1	FEEE's educational philosophy	Picture
2	4.2	List of courses for pedagogical methods	Document
3	4.3	Online E/M learning courses	
	4.3a	EM Learning Policies for lecturers	Document
	4.3b	E/M learning course's contents	Picture
	4.3c	E/M learning course's video clips	Picture
4	4.4	Activities in Introduction to Automation and Control Engineering Technology course	Picture
5	4.5	Syllabus of general knowledge courses	Document
6	4.6	Sample reports of course project	Document
7	4.7	List of practical courses	Document
8	4.8	Reviews of employers on internship	
	4.8a	A form of internship report	Document
	4.8b	Reviews of employers on internship	Document
9	4.9	Student scientific research	Document
10	4.10	Information about student contests	Picture
11	4.11	Information about labs of FEEE	
	4.11a	List of Lab Managers	Document
	4.11b	Information about LABs sponsors	Document
12	4.12	Feedback for teaching and learning ISO procedure	
	4.12a	Procedure	Document
	4.12b	Feedback forms	Document
13	4.13	Activities in English clubs	Picture
14	4.14	Poster of a thesis	Document
15	4.15	Guidelines for course projects	Document
16	4.16	Student activities	
	4.16a	Information	Document
	4.16b	Activities	Picture

No	Exh.	Title of Exhibition	Category
	Criteria 5: Student Assessment		
1	5.1	Student enrollment project	
	5.1a	Student enrollment project	Document
	5.1b	University benchmark	Document
2	5.2	English pre-test	
	5.2a	Decision No 1586/QĐ-ĐHSPKT	Document
	5.2b	Holding English pre-test	Picture
3	5.3	ISO procedure for testing	
	5.3a	Procedure for composing and keeping confidentially the test	Document
	5.3b	Regulations for module assessment	Document
4	5.4	Internship Rubric	
	5.4a	Introduction letter	Document

No	Exh.	Title of Exhibition	Category
	Criteria 5: Student Assessment		
	5.4b	Rubric for assessment	Document
5	5.5	Assessments of the graduation thesis	
	5.5a	Thesis rubric	Document
	5.5b	Thesis committee	Document
	5.5c	Thesis reports	Picture
	5.5d	Students activities	Picture
6	5.6	Regulations of the university in the credit system	Document
7	5.7	Decision No 1163/QĐ-ĐHSPKT	Document
8	5.8	Procedures	
	5.8a	Inspecting and examining	Document
	5.8b	Evaluating student's satisfaction	Document
9	5.9	Courses assessments	
	5.9a	Rubric forms	Document
	5.9b	Writing examinations	Document
10	5.10	Online E/M learning courses	
	5.10a	E/M Learning Policies for lecturers	Document
	5.10b	E/M learning course's contents	Picture
	5.10c	E/M learning course's video clips	Picture
11	5.11	Lecturer Portfolio	Document
12	5.12	Marking schemes in writing examinations and answers	
	5.12a	Writing examinations and answers	Document
	5.12b	Student answers	Document
13	5.13	Procedure for planning and organizing examination	Document
14	5.14	Workshops on student's assessment	Document
15	5.15	Online Survey form	Document
16	5.16	Rubrics for Practical courses	Document
17	5.17	Verified results and procedure for planning and organizing examination	
	5.17a	Procedure	Document
	5.17b	Verified results	Document

No	Exh.	Title of Exhibition	Category
	Criteria 6: Academic Staff Quality		
1	6.1	FEEE 2013-2018 Strategic Plan with a vision to 2020	Document
2	6.2	The announcement to participate the training courses and seminars	Document
3	6.3	Lists of English training courses, visiting courses	
	6.3a	List of English training courses	Document
	6.3b	List of the visiting courses	Document
4	6.4	HCMUTE and MOET workload regulations	
	6.4a	HCMUTE workload regulations	Document

	6.4b	MOET workload regulations	Document
5	6.5	Meetings of department	Document
6	6.6	Working load survey and report	Document
7	6.7	Lecturer recruitment policy	Document
8	6.8	Lecturer promotion policy	Document
9	6.9	Assessment Method Regulations and Lecturer Professional Ethics	
	6.9a	Assessment Method Regulations	Document
	6.9b	Lecturer Professional Ethics	Document
10	6.10	Lecturer KPI system and student surveys	
	6.10a	Lecturer KPI system	Document
	6.10b	Student surveys	Document
11	6.11	Process of HR development	Document
12	6.12	FEEE Annual Objectives and Plan	
	6.12a	Objectives and Plan 2015-2016	Document
	6.12b	Objectives and Plan 2016-2017	Document
	6.12c	Objectives and Plan 2017-2018	Document
13	6.13	The training courses of English from 2013 to 2017	Document
14	6.14	The visiting courses in India, Taiwan, Korean, and others from 2013 to 2017	Document
15	6.15	HCMUTE Lecturers in HEEAP Program	Document
16	6.16	ISO procedure for scientific research	Document
17	6.17	Funding for project support	Document
18	6.18	Scientific research policy	Document
19	6.19	Statistics of publication papers	Document
20	6.20	Paper publication reward policy	Document

No	Exh.	Title of Exhibition	Category
	Criteria 7: Support staff quality		
1	7.1	List of laboratory	Document
2	7.2	Criteria for the promotion of faculty board	Document
3	7.3	Planning for manager appointment of HCMUTE	Document
4	7.4	Qualified appointee following the Higher Education Law and the university rule	Document
5	7.5	Short-term courses and supporting feedbacks	
	7.5a	Short-term courses	Document
	7.5b	Supporting feedbacks	Document
6	7.6	FEEE training seminars for laboratory manager	
	7.6a	ETAP Software Training	Document
	7.6b	ABB Switch-Relay Device Training	Document
7	7.7	Course lists	Document
8	7.8	Course plans decisions results certificates course contents and suggestions	Document
9	7.9	Financial report	Document

No	Exh.	Title of Exhibition	Category
	Criteria 7: Support staff quality		
10	7.10	Rewards of HCMUTE president, MOET, other organizations and lists of levels A, B	Document

No	Exh.	Title of Exhibition	Category
	Criteria 8: Student Quality and Support		
1	8.1	Recruitment decisions and announcement	
	8.1a	Recruitment decisions	Document
	8.1b	Announcement	Document
2	8.2	Advisory pictures for recruitment	Document
3	8.3	Policy decision and the ACET	
	8.3a	Policy decision	Document
	8.3b	The ACET	Document
4	8.4	Online learning-teaching information and dashboard	
	8.4a	Online learning-teaching information	Document
	8.4b	Dashboard	Document
5	8.5	Studying warnings	Document
6	8.6	Thesis report and rubrics	
	8.6a	Thesis report	Document
	8.6b	Thesis rubrics	Document
7	8.7	Scholarship from alumni	Picture
8	8.8	Showing activities and training courses for new students	
	8.8a	Showing activities	Document
	8.8b	Training courses for new students	Document
9	8.9	First week activities of new students	
10	8.10	English testing list	Document
11	8.11	FEEE Student Prizes	Document
12	8.12	FEEE Student Competitions	Document
13	8.13	Job orientation and visiting trips	
	8.13a	Job orientation	Document
	8.13b	Visiting trips	Document
14	8.14	FEEE seminars	Document
15	8.15	Healthy information and warning pictures	Document

No	Exh.	Title of Exhibition	Category
	Criterion 9: Facilities and Infrastructure		
1	9.1	Plan for upgrading the facility of FEEE	Document
2	9.2	Survey and Feedback	Document
3	9.3	Collaboration with universities and satisfactions' feedbacks	
	9.3a	Lecture and student accounts for e-library	Document
	9.3b	Satisfactions' feedbacks	Document

	9.3c	Collaboration with universities	Document
4	9.4	Resource information. FEEE book plans and My OPAC	
	9.4a	Resource information	Document
	9.4b	FEEE book plans	Document
	9.4c	My OPAC	Document
5	9.5	Equipment and maintenance information	Document
6	9.6	Annual target	Document
7	9.7	PC statistics	Document
8	9.8	A decision on establishing Digital learning room	Document
9	9.9	MOU information	Document
10	9.10	Information of courses applying DLC in LMS	Document
11	9.11	Health care and disease prevention lists	
	9.11a	Healthcare lists	Document
	9.11b	Disease prevention	Document
12	9.12	HCMUTE security information	Document

No	Exh.	Title of Exhibition	Category
	Criteria 10: Quality Enhancement		
1	10.1	ISO management procedure with specific guidelines	Document
2	10.2	Decision 07/2015/TT-BGDĐT, 17/04/2015	Document
3	10.3	The decision for adjusting the curriculum	
	10.3a	ISO procedure for adjusting the annual curriculum, meeting minutes and curriculum information on websites	Document
	10.3b	Decision 125/QC-ĐHSPKT-ĐT, 22/12/2008	Document
4	10.4	Poster of the final project	Document
5	10.5	Assessment decision and policy	Document
6	10.6	Rubric for Projects and Thesis	Document
7	10.7	Course Portfolio	Document
8	10.8	Department meeting minutes	Document
9	10.9	Students won SHARE scholarship, International collaboration	
	10.9a	Students won SHARE scholarship	Document
	10.9b	International collaboration	Document
10	10.10	Research output application	Document
11	10.11	Student's prizes in competitions	Document
12	10.12	32/2015/TTBGDĐT (16/12/2015)	Document
13	10.13	Dormitory, Library, Lab, SSC, Health Care surveys	Document
14	10.14	Library information	
	10.14a	Account list and material information	Document
	10.14b	Library public spaces	Document
15	10.15	Equipment maintenance	Document
16	10.16	Healthy support decisions and the environment	Document
17	10.17	Hygiene and environment at Buildings for students	Document
18	10.18	Feedback's mechanisms	Document

No	Exh.	Title of Exhibition	Category
	Criteria 11: Output		
1	11.1	Pass and dropout rates from the Dashboard system, ASAO, and Benchmark	
	11.1a	Dashboard system	Document
	11.1b	Pass and dropout rates Benchmark	Document
2	11.2	Department meeting minutes, group meeting	
	11.2a	Department meeting minutes	Document
	11.2b	Group meeting	Document
3	11.3	Effective solutions to support students and lecturers	
	11.3a	Effective solutions to support students	Document
	11.3b	Effective solutions to support lecturers	Document
5	11.4	Scholarship sources for students	Document
6	11.5	Rubrics for assessment, teaching assistant system, summer semester.	
	11.5a	Rubrics for assessment	Document
	11.5b	Teaching assistance system	Document
	11.5c	Summer semester	Document
4	11.6	Field trips for students	Document
	11.7	Rubrics for assessment, teaching assistance system, summer semester	Document
7	11.8	Mini-test, mid-term evaluation, LMS, project-based learning	
	11.8a	Mini-test, mid term evaluation	Document
	11.8b	LMS	Document
	11.8c	Project-based learning	Document
8	11.9	The online survey of employability of graduates	Document
9	11.10	Meeting with students, Alumni, and companies	
	11.10a	Meeting with students	Document
	11.10b	Meeting with Alumni	Document
	11.10c	Meeting with Companies	Document
10	11.11	Activities of English classes and clubs	
	11.11a	Activities of English classes	Document
	11.11b	Activities of English Clubs	Document
11	11.12	Activities of soft skill classes	Document, Pictures
12	11.13	Report and assessment for Projects 1,2 and capstone project	
	11.13a	Report and assessment for Projects 1,2,3	Document
	11.13b	Report and assessment for Capstone	Document
13	11.14	Activities of open labs and research groups	
	11.14a	Activities of open labs	Document
	11.14b	Activities of research groups	Document
14	11.15	Field trip, Labor market event, technology transfer	
	11.15a	Field trip, Labor market event	Document

	11.15b	Technology transfer	Document
	11.16	Activities of soft skill classes and advisory	
15	11.17	Guide to register and research process of student	Document
16	11.18	Activities of student competitions and rewards	Document
17	11.19	Workshops information	
	11.19a	IoTs workshops	Document
	11.19b	Embedded system workshops	Document
	11.19c	Telecommunication workshops	Document
18	11.20	FEEE meeting, online survey for staff	
	11.20a	FEEE meeting	Document
	11.20b	Online survey for staff	Document
19	11.21	Meetings and feedback of Alumni	Document

HCMUTE

Contact information:

Ho Chi Minh City University of Technology And Education

No.1 - Vo Van Ngan Street
Linh Chieu Ward - Thu Duc District
Ho Chi Minh City - Vietnam

Website: www.hcmute.edu.vn