SELF - ASSESSMENT REPORT FOR AUN-QA

HCMUTE

HO CHI MINH CITY UNIVERSITY OF TECHNOLOGY AND EDUCATION

FACULTY OF MECHANICAL ENGINEERING

BACHELOR OF ENGINEERING

IN MACHINE MANUFACTURING TECHNOLOGY

AUN-QA
A Touch of Quality

The AUN Quality Assessment at Programme Level

November 07 - 09, 2017

AUN-QA SELF-ASSESSMENT REPORT

of the Bachelor of Engineering in

MACHINE MANUFACTURING TECHNOLOGY

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

Assoc. Prof. Dr. Nguyen Truong Thinh

Dean

Faculty of Mechanical Engineering

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LIST OF ABBREVIATIONS

AAO	Academic Affairs Office
ASC	Academic and Scientific Committee
ASAO	Admissions and Students Affairs Office
BUILD-IT	Building University-Industry Learning and Development through Innovation and Technology
CAD	Computer Aided Design
CAE	Computer Aided Engineering
CAM	Computer Aided Manufacturing
CLO	Course Learning Outcome
ELO	Expected Learning Outcome
ERC	Emulation and Reward Committee
FME	Faculty of Mechanical Engineering
FTE	Full-time Equivalent
GPA	Grade Point Average
HEEAP	Higher Engineering Education Alliance Programme
HCMUTE	Ho Chi Minh City University of Technology and Education
HRMO	Human Resource Management Office
ISO	International Organization for Standardization
KPIs	Key Performance Indicators
LMS	Learning Management System
MMT	Machine Manufacturing Technology
MoET	Ministry of Education and Training
MoU	Memorandum of Understanding
PRO	Public Relation Office
QAO	Quality Assurance Office
SAR	Self-Assessment Report
TA	Teaching Assistant
VEEC	Vietnam Engineering Education Conference
VULII	Vocational and University Leadership and Innovation Institute

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PART 1: INTRODUCTION

1. Executive summary

The Machine Manufacturing Technology (MMT) programme has been selected as the second one of the Faculty of Mechanical Engineering (FME), Ho Chi Minh City University of Technology and Education (HCMUTE) for AUN accreditation. This document is prepared as the Self-Assessment Report which provides detailed information on various quality aspects of the programme.

The report is divided into four parts:

- Part One: The introduction to the HCMUTE and FME.
- Part Two: The analyses of the MMT programme in accordance with AUN-QA criteria.
- Part Three: The strengths and weaknesses of the programme and areas for improvement.
- Part Four: Appendices

A SAR team formulated in June 2016 consists of Dean Board, Department Heads and experienced lecturers. This team has been responsible for researching and studying AUN criteria, collecting facts and evidences, and writing the report for self-assessment activities. With the team's efforts as well as the support of the Quality Assurance Office (QAO), the latest version of SAR was completed in July 2017.

2. Ho Chi Minh City University of Technology and Education (HCMUTE)

Ho Chi Minh City University of Technology and Education is the first university in Vietnam to educate and train technical teachers for the whole country. Chronologically, HCMUTE has been renamed several times due to integration with other schools or its own promotion. The University evolved from the Board of Technical Education, first founded on October 5th 1962, then renamed as Nguyen Truong To Centre for Technical Education in Thu Duc in September 1972, and later upgraded to Thu Duc College of Education in 1974. On October 27th 1976, the Socialist Republic of Vietnam Prime Minister issued a decision to establish Thu Duc University of Technical Education on the basis of Thu Duc College of Education. This was amalgamated with Thu Duc Industrial Vocational School in 1984 and further merged with Technical Teacher Training School No.5 in 1991 to become the present Ho Chi Minh City University of Technology and Education under the supervision of the Ministry of Education and Training of Vietnam (MoET).

As of 2017, HCMUTE has 15 faculties, 20 functional units, and 16 institutes and centres. There are over 630 lecturers working and teaching at HCMUTE. The university has an area of 21.036 hectares, with 60,333 hectares of construction floors.

Based on its traditional fortes in science, engineering and technology, HCMUTE is now offering:

- 06 Ph.D.'s programmes.
- 11 Master's programmes.
- 25 Bachelor's programmes.
- 03 Associate programmes.
- 06 Technician Diploma programmes.

2.1. Vision

The vision of the HCMUTE is to become a top centre of training, research, creativity, innovation and entrepreneurship in Vietnam, on a par with regional and worldwide prestigious universities.

2.2. Mission

The mission of HCMUTE is to be a leading institution in training, scientific research and technology transfer in Vietnam, continuously innovate to provide human resources and scientific products with high quality in the fields of technical and vocational education, science and technology to meet the demands of the economic-social development of the country and the region.

2.3. Organizational structure of HCMC University of Technology and Education

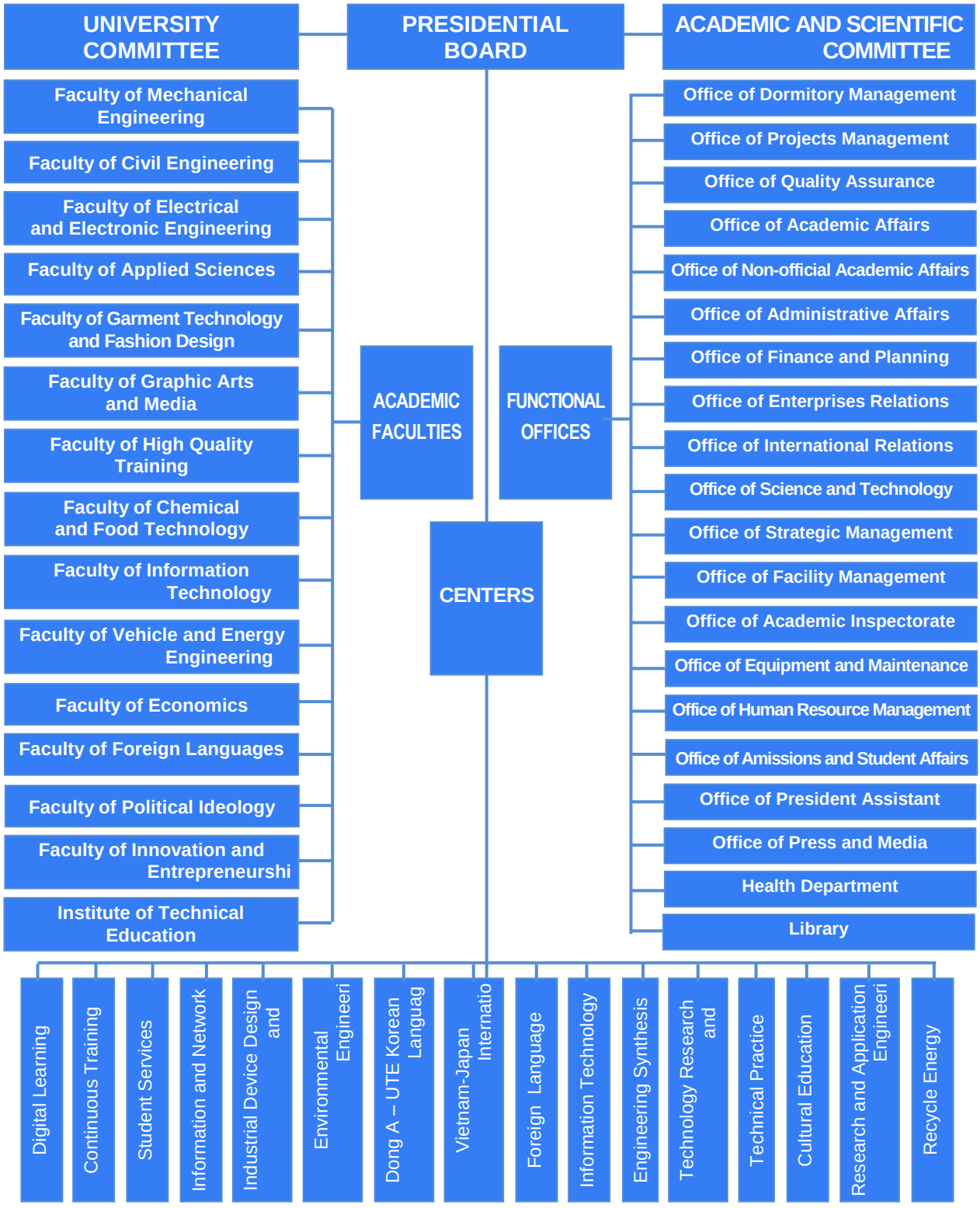


Figure 0. 1: Organizational structure of HCMC University of Technology and Education

2.4. Quality assurance system of HCMUTE

Quality policy of HCMUTE

"Continuously upgrade 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 activities

HCMUTE has been applying ISO 9001:2000 quality management system since 2005 and the system has been maintained until now with 41 quality management processes being issued, adjusted and added during the operation. Quality Assurance Office (QAO) was established in 2008 from the quality management staff of the Academic Affairs Office (AAO) in order to:

1. Assist the President and directly implement management activities in accordance with ISO 9001:2000

2. Investigate and evaluate internal education quality of the university.

3. Supervise all assessment and accreditation work at university level and program level in compliance with regulations of MoET.

Quality Assurance activities of the university in recent years are stated as below:

- 2005: External assessment by the MoET standards.
- 2007: Achieving ISO 9001:2000 Certification.
- 2011: External Audit of Technical Education Industrial Electrical Engineering programme by MoET standards.
- 2014: Becoming an AUN-QA Associate member.
- March 2016: Achieving AUN-QA Certification for 3 programmes (Mechatronics Engineering Technology, Electrical and Electronic Engineering Technology, Automotive Engineering Technology).
- November 2016: Achieving Quality Accreditation at Institutional level by MoET standards.
- March 2017: Achieving AUN-QA Certification for Construction Engineering Technology programme.
- By the year 2020, HCMUTE will have had 100% of the academic programmes accredited by the standards of international or regional accreditation organizations.

3. Faculty of Mechanical Engineering (FME)

3.1. Vision of FME

FME will become a top esteemed institution in Southern Vietnam region for training, scientific research and technology transfer in mechanical engineering field; to be the pride of HCMUTE in its process of comprehensive and sustainable development and international integration.

3.2. Mission of FME

- To make the Faculty become the leading unit in education and research in mechanical and automatic fields in Viet Nam.
- To cooperate firmly with the University and the Industry in training, research, technology amelioration and knowledge innovation to serve the industrialization and modernization of the nation.
- To provide learners with an excellent educational environment for comprehensive learning, research and training in theory and practice, skills and ethics development to meet the requirements of the regional and international integration.

3.3. Core values of FME

Ethics: *Respect and follow all the ethic standards*

Respect: *Self-respect and respect for other colleagues, students and partners*

Equality: *Treat other colleagues and students equally*

Union and Sincerity: *Sincerely help and unite together*

3.4. Quality Policy of FME

The slogan that FME has been carrying along during its more than 50 years of development since the establishment in 1965 is "Comprehensiveness, Creativeness and Ambitiousness".

3.5. Organizational structure of FME

FME has 89 academic staff including 26 PhDs (not including 05 PhDs who are leaders and managers of the university), 47 Masters of Science and 04 academic staff studying PhD abroad.

The Faculty has seven departments and one centre. It offers graduate and undergraduate study programmes at 03 different levels:

- PhD. in Mechanical Engineering
- Master in Mechatronics Engineering Technology
- Master in Mechanical Engineering
- Bachelor in Mechatronics Engineering Technology
- Bachelor in Mechanical Engineering Technology
- Bachelor in Machine Manufacturing Technology
- Bachelor in Industrial Engineering
- Bachelor in Woodwork Technology

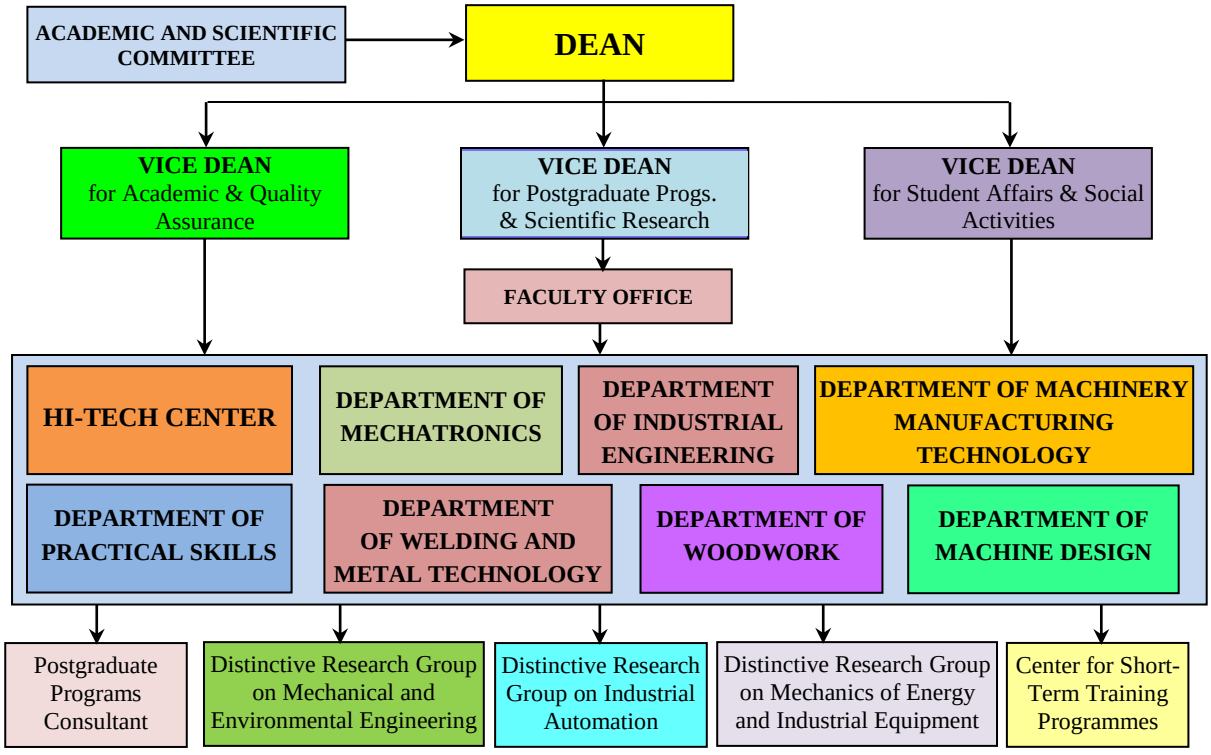


Figure 0. 2: Organizational structure of FME

To support teaching, learning and research, FME has established 27 laboratories and workshops, 3 distinctive research groups. In addition, FME has 8 laboratories for research purpose *[Appendix 1: List of Laboratories and Research Groups]*.

4. The Machine Manufacturing Technology programme

The Machine Manufacturing Technology (MMT) programme is aimed to train mechanical engineers with solid background on fundamental sciences and professional knowledge related to manufacturing engineering; good skills at critical thinking, problem solving and evaluation; good ability of planning of production processes, participating in organizing, operation and management duties; proficient communication and teamwork skills; appropriate professional attitudes to adapting to the development of the major and the society.

Job Opportunities

After graduation, graduates can work in mechanical engineering factories and companies. They can also work in the fields of engineering services or R&D departments in the role of direct operators, facilitators or managers. Thanks to the prestige of the programme and the increasing demand for human resources in the mechanical engineering sector to cater for the industrialization and modernization of the country, graduates can find good jobs within the first three months after graduating. Students who have pursued the programme easily get information about job opportunities on website of FME *[http://fme.hcmute.edu.vn/TopicId/cc5e04d0-2ede-4a90-9c0c-d4b4c4aae783/career-recruitment]*.

PART 2: AUN-QA CRITERIA

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

Based on the missions of HCMUTE and FME, the MMT programme was developed in 2011 and applied in 2012 with the purposes of training high quality human resources for the economic-social development of the country as well as the region and orienting to international integration.

The objectives of the MMT programme are to prepare students to:

1. Possess and apply general and professional knowledge to work effectively and implement lifelong learning in the field of mechanical manufacturing.
2. Execute self-learning, critical thinking, problem solving and professional skills in the field of mechanical manufacturing.
3. Communicate effectively in the professional environment, leadership and team work situations. Be aware of social responsibility and ethical behaviour.
4. Conceive, design, implement and operate effectively mechanical manufacturing systems.

The programme objectives totally meet Vietnam Education Law in which the goal of education is to train human for comprehensive development, ethics, knowledge, health, aesthetics and professional, loyalty to the ideals of national independence and socialism; form and nurture the personality, qualities and competencies of citizens, meeting the requirements of building and defending the country.

Table 1.1: The consistency between the target of Vietnam Law on higher education, HCMUTE's mission, FME's mission, and Programme Objectives

<table>
<tr><th>Law on higher education</th><th>HCMUTE mission</th><th>FME mission</th><th>Programme Objectives</th></tr>
<tr><td rowspan="3">The university education provides students with the comprehensive profession knowledge, thorough grasp of the natural – social law and principle, basic practical skill and the ability to work independently, creatively and solve the problems related to the trained profession.</td><td rowspan="3">The mission of HCMUTE is to be a leading institution in training, scientific research and technology transfer in Vietnam, continuously innovate to provide human resources and scientific products with high quality in the fields of technical and vocational education, science and technology to meet the demands of the economic-social development of the country and the region.</td><td>1. To make the Faculty become the leading unit in education and research in mechanical and automatic fields in Viet Nam.</td><td rowspan="2">PO 1: Possess and apply general and professional knowledge to work effectively and implement lifelong learning in the field of mechanical manufacturing.
PO 4: Conceive, design, implement and operate effectively mechanical manufacturing systems.</td></tr>
<tr><td>2. To cooperate firmly with the University and the Industry in training, research, technology amelioration and knowledge innovation to serve the industrialization and modernization of the nation.</td></tr>
<tr><td>3. To provide learners with an excellent educational environment for comprehensive learning, research and training in theory and practice, skills and ethics development to meet the requirements of the regional and international integration.</td><td>PO 2: Execute self-learning, critical thinking and problem solving and professional skills
PO 3: Communicate effectively in the professional environment, leadership and team work situations. Be aware of social responsibility and ethical behaviour.</td></tr>
</table>

In order to meet the programme objectives, the expected learning outcomes (ELOs) of the MMT programme in 2012 were revised from the one in 2008 with a careful consideration of:

- The visions and missions of HCMUTE and FME.
- The feedback of the industries about their current requirements *[Exh.1.1: Feedback of stakeholders in 2011]*.
- The feedback of faculty, students and alumni about the quality of the programme.
- The benchmarking between the MMT programme of FME with those of some prestigious universities in Vietnam, in Asia and in the world *[Exh.1.2: Benchmarking of MMT programme]*.

The ELOs of the MMT programme:

After successful completion of the programme, students will be able to:

- ELO 1: Use general knowledge of mathematics and science to learn professional knowledge and pursue higher education.
- ELO 2: Apply the fundamental knowledge and core skills of mechanical engineering.
- ELO 3: Analyse, synthesize and solve manufacturing engineering problems.
- ELO 4: Measure and interpret experimental data related to mechanical engineering and master professional skills.
- ELO 5: Lead and work effectively in individual and group-oriented settings.
- ELO 6: Communicate effectively in different forms, such as writing, multimedia, graphics, and presentation.
- ELO 7: Demonstrate the ability to use English in mechanical engineering, with an emphasis on reading and writing skills.
- ELO 8: Exhibit life-long learning ability.
- ELO 9: Appreciate different enterprise cultures, demonstrate professional behaviours and work successfully in industrial organizations.
- ELO 10: Conceive, plan and manage the projects in accordance with the industrial requirements.
- ELO 11: Design technological equipment and processes.
- ELO 12: Implement the production, assembly and quality assurance of mechanical equipment and facilities.
- ELO 13: Operate and maintain the production systems.

These ELOs fully satisfy the requirements of the stakeholders and are highly evaluated *[Exh.1.3: Revision of the ELOs of MMT programme]*. Matrix of programme objectives versus ELOs is illustrated in Table 1.2.

Table 1.2: Matrix of Programme objectives vs. Expected learning outcomes

Programme Objectives	**Expected Learning Outcomes**												
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
1	X	X						X					
2			X	X									
3					X	X	X		X				
4										X	X	X	X

The ELOs of the MMT programme were published in 2012 with the HCMUTE Decision for issuing ELOs. These ELOs are documented in the MMT programme specification, which is delivered to all faculties and students and published on the university and the faculty's websites for others who may

concern *[http://en.hcmute.edu.vn/], [http://fme.hcmute.edu.vn/]*. The ELOs are also introduced to freshmen in the Introduction to Mechanical Engineering course at the beginning of the new school year *[Exh.1.4: Approaches to ELOs]*.

Every four years, the ELOs are evaluated and revised based on the stakeholders' feedback *[Exh.1.5: Feedback of stakeholders in 2016]*.

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

The ELOs were made based on the Bloom's Six Levels of the cognitive domain of learning from knowledge to evaluation. The assessment of these learning goals and the role of the programme in helping students attain these outcomes are presented below:

The ELOs are translated into the knowledge, skills, attitudes and life-long learning (see Table 1.3). The students achieve these ELOs through courses (see The Appendix 2: *Matrix of Courses vs. Expected learning outcomes of Machine Manufacturing Technology programme*) and extracurricular activities such as field trips, practicum, seminars, technical contests, and cultural and social activities (The Appendix 4: *Matrix of Extracurricular activities vs. Expected learning outcomes*).

Table 1.3: ELOs grouped by knowledge, skills, attitudes and life-long learning

Knowledge and Skills		**ELOs**
Generic Knowledge	– Mathematics, science	ELO 1
Specific Knowledge	– Understanding and knowledge of mechanical engineering	ELO 2, 3, 10, 11, 12, 13
Generic Skills	– Reasoning, critical thinking, team work, self-regulating, problem solving, self-learning – Communication, sense of engineering analysis, synthetic approach	ELO 5, 6
Specific Skills	– The use of common Lab instruments in mechanical engineering – Engineering system design and data analysis and assessment	ELO 4, 10, 11, 12, 13
Attitudes	– Social ethics and responsibility. – Professional and ethical responsibility	ELO 9
Life-long learning	– Scientific knowledge and skills for life-long learning	ELO 1, 7
	– Perception on life-long learning	ELO 8

To help students achieve ELOs, courses are taught according to the student-centred approach in classes, laboratories, professional practices and research projects. All teachers have to submit their course outlines to the MMT Department, which contain their teaching strategies before the courses begin. In early 2014, teaching assistant team was established in the whole university and then has been highly contributing to learning process of students.

Students achieve ELOs for general and professional knowledge through fundamental background courses and specialized courses which provide students with the know-how to apply in-depth understanding of mechanical engineering and industrial automation. ELOs which call for professional skills are trained through practice activities in fundamental courses, specialized courses, course projects and experiment courses. Students have to successfully complete compulsory theoretical and practical courses on natural science, core courses (i.e. theory and

practise) belonging to basic and specialization of mechanical engineering, including formative and summative examinations, assignments, and projects in each course.

Besides compulsory course projects, students are also encouraged to do applied scientific researches under teachers' guidance. These student projects will boost their independent thinking skills and competence in doing research. With these competencies, graduates can pursue higher education or take part in research and innovation groups to create new products.

The ELOs on attitudes, cultures and behaviour are transferred to students within seminars, practices in factories and other social activities such as the Green Summer Volunteer Campaign, Blood donation, Charitable activities, etc. (see Appendix 4: *Matrix of Extracurricular activities vs. Expected learning outcomes*) *[Exh.1.6: Extracurricular activities]*. FME often organizes extracurricular activities throughout the school time and encourages students to engage in these after their classes.

The ELOs for soft skills and professional attitudes for future career are also transferred via extracurricular activities such as seminars, union activities and social activities. Some course projects are implemented in teams will strengthen communication skill, critical thinking, teamwork skills or project management.

All the curricular and extracurricular activities are organized throughout the programme and collaborate with each other to give students opportunities to experience various learning environments (in class, factory, society, etc.). Students also receive support from groups and centres of the university, such as Student Association, Youth Union, Student Affairs Office, Student Service Centre, etc. For example, Student Affairs Office is authorized to offer reward, punishment, scholarships and special policies to students. The office has to investigate carefully students' learning process by means of their database and then propose relevant encouraging, supporting or preventing policies.

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

The HCMUTE has implemented management activities in accordance with ISO 9001:2000 by controlling, upgrading and maintaining quality management system based on the issued ISO standards. The Regulation for revising procedure of study programme, including ELOs, has been promulgated. According to the Regulation, Dean of the FME has to work with head of MMT Department to develop an annual plan for the updating and revising of the programme in accordance with the requirements of stakeholders through annual surveys and workshops. All changes require the approvals of the FME Academic and Scientific Committee. Next, head of the Office of Academic Affairs will verify it and submit to the Presidential Board for official approvals *[Exh.1.7: Revising the MMT programme]*.

The ELOs of the MMT programme are also analysed and assessed to extract prominent amendment with the four-year revision cycle. All verifications if necessary will be notified to stakeholders by sending emails and updating on the FME website.

The university and faculty periodically conduct surveys to investigate, evaluate comments and feedback of the labour market/alumni about the MMT programme. Besides having specialized knowledge and skills of mechanical engineering career, graduates need to meet specific requirements such as communicating, independent and group working, critical thinking skill, effective cooperation in multidisciplinary organizations, professional and ethical responsibilities, etc. The feedback plays an important role in revising the programme specification. Survey data have been collected directly on Job Fair or through surveys which are annually held by FME and Public Relations Office *[Exh.1.5: Feedback of stakeholders in 2015, 2016]*.

Feedback from stakeholders has been collected and used for improvement. The Appendix 2 shows considerable updates of the programme from 2008 to 2011 (the 186 credits programme) to the current 2012 programme (the 150 credits programme). Some intermediate courses and specialized courses have been reduced in terms of number of credits thanks to the use of active learning methods and to

save time to promote self-study. Some courses are also integrated to each other to eliminate the overlapped knowledge and to enhance the efficiency in training (Table 1.4) *[Exh.1.8: MMT programmes in 2004, 2008 and 2012]*.

Table 1.4: Some integrated courses in MMT programme applied in 2012

No	**Curriculum (applied from 2008 to 2011)**	Credit No.	**Curriculum (applied from 2012 till now)**	Credit No.	**Note**
1	Basic AutoCAD	2	Computer aided design (CAD)	3	Merged course
2	Basic AutoCAD practice	1			
3	Electrical engineering	3	Electrical – Electronics Engineering	3	Integrated course
4	Electronics engineering	3	Experiments on Electrical – Electronic Engineering	1	
5	Basic CAD/CAM-CNC	2	CAD/CAM-CNC Technology	3	Integrated course
6	Advanced CAD/CAM-CNC	3			
7	Experiments on Basic CAD/CAM-CNC	1	Practice of CAD/CAM-CNC Technology	2	Integrated course
8	Experiments on Advanced CAD/CAM-CNC	1			
9	Pneumatic – Hydraulic Technology	4	Pneumatic – Hydraulic Technology	3	Added experiments
			Experiments on Pneumatic – Hydraulic Technology	1	
10	Graduation dissertation	7	Capstone project	10	Credits increased

In addition, many important changes for the programme have been made since 2012, as listed below:

1. At the first semester, freshmen are required to take the Introduction to Mechanical Engineering course that introduces general concepts related to MMT, basic problems of practical careers, requirements of the programme and job opportunities for mechanical engineers. Through this course, students will be gradually aware of the characteristics of their study and their future careers *[Exh.1.9: Syllabus and portfolio of "Introduction to Mechanical Engineering"]*.

2. Building the process of performing course projects and capstone project as well as designing rubrics for assessing them *[Exh.1.10: Assessment rubrics]*.

3. Inviting the employers to attend the Defence Committee for assessing the capstone project *[Exh.1.11: Activities in capstone project]*.

CRITERION 2: PROGRAMME SPECIFICATION

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

When opening the Machine Manufacturing Technology programme, Faculty of Mechanical Engineering prepared "the documents for opening a programme" and submitted to the Academic and Scientific Committee (ASC) of HCMUTE and to the MoET *[Exh.2.1: Deployment of the programme specification]*. The structure of the documents was regulated with the following information:

MACHINE MANUFACTURING TECHNOLOGY PROGRAMME SPECIFICATION

1. **Awarding institution:** HCMC University of Technology and Education
2. **Name of the final award:** Bachelor of Engineering (Machine Manufacturing Technology)
3. **Programme Title:** Machine Manufacturing Technology
4. **Expected learning outcomes of the programme** (as stated in Criterion 1, page 7)
5. **Admission criteria or requirements to the programme:**

In order to get admission to the MMT programme, high school candidates have to take the National High School Graduation Examination which is held annually on July by MoET. The MMT programme enrols students in one of three groups: Group "A" with 3 subjects (Mathematics, Physics, and Chemistry), Group "A1" with 3 subjects (Mathematics, Physics, and English) and Group "D1" with 3 subjects (Mathematics, Literature, and English). The cumulative testing grade of candidates must be higher than the cut-off score which is set by the university based on the student admission quota from MoET. Additionally, FME reserves the maximum 20% of the annual admission quota for candidates who have graduated from specialized high school or won the prizes in the National Academic Examination.

6. **Programme structure and requirements including levels, courses, credits, etc.:** *[Appendix 3: Curriculum map]*.

7. **Date on which the programme specification was written or revised:** written in January 2012 and reviewed in October 2015.

8. **Programme contact:**

Assoc. Prof. Dr. Truong Nguyen Luan Vu - Vice Dean

Email: luanvutn@hcmute.edu.vn

Phone number: 848-0909011136

Mailing address: 01 Vo Van Ngan, Thu Duc District, HCMC, VN

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

The programme ELOs are transferred into the course learning outcomes (CLOs) and expressed in the course specification. All courses have CLOs which are supportive to ELOs at different levels such as partly-supportive, supportive and highly-supportive. The course specification obviously shows the learning map to achieve the CLOs. When students successfully complete all the courses they are expected to achieve all programme ELOs.

The group of lecturers who teach the same course is responsible for writing and revising the course specification. The course specification is approved by the leaders of department and the board of faculty. The structure of course specifications is standardized as follows:

1. Course title (in Vietnamese and in English)
2. Course code
3. Lecturers
4. Conditions to take the course
5. Course Description
6. Course Goals
7. Course learning outcomes
8. Contribution of course to ELOs
9. Structure and content of the course

10. Course materials
11. Teaching and learning methods
12. Assessment methods
13. Date on which the course specification was written or revised and leaders who approved it

Based on the approved course specification, lecturers prepare the course portfolio which should include: the objectives of the each chapter; textbooks, handouts; assignments and projects; testing and assessment tools and teaching strategies *[Exh.2.2: Some course syllabi]*.

At the end of semester, lecturers teaching the same course conduct the summary meeting to revise the course portfolios and syllabi based on faculty and students' feedback as well as from the requirements of employers. Any changes in content, course materials, teaching and learning methods, assessment, etc. will be approved by MMT Department and the board of FME when reviewing the course specification *[Exh.2.3: Revising the course specification]*.

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

The programme specification is implemented by the FME and monitored by the Academic Affairs Office (AAO). It is also published on the FME website. Its hard copy is always available at the office of the FME and MMT Department to assist administrative staffs and faculties while they set up the learning schedules, teaching arrangement and study advice for students. Students can make their learning plan by referring to it and getting advice from their academic advisor.

The programme specification is promulgated for freshmen in orientation seminars which are annually organized by FME. These seminars provide enough detailed information including fields, knowledge and skills that students need to obtain, and also opportunities for future career and further study.

Each lecturer implements the course specification by making his/her course portfolio and uploads it online before the course starts (using the LMS provided by the university) to inform students about CLOs, the contribution of the course to the ELOs, course contents, textbook, teaching and assessment method, and so on *[Exh.2.4: Some course portfolios]*.

The programme specification with the curriculum map is used by the university, the FME, lecturers and students with the following procedure:

1. At the beginning of each semester, departments in the FME uses the MMT programme specification to make the teaching plan and assigns lecturers for each course based on their capability and time slots and submits it to the AAO.
2. After assigned teaching schedules for all the courses are finished by the AAO, they will be announced to faculty and students online *[https://online.hcmute.edu.vn/]*.
3. Students refer to the MMT programme specification and rely on the teaching schedule from the AAO to make their own learning strategies. Students are supposed to make the most appropriately tentative schedules for their own and then register for the courses online.
4. Based on the approved syllabi, lecturers prepare the course portfolio which should include: the CLOs, the objectives of each chapter; textbooks, handouts; testing and assessment tools and teaching strategies.

The Academic Regulations applied in the Programme specification are the legal bases for the stakeholders during the activities of organizing, managing and teaching of the programme. It also is used as a reference for national and international accreditations.

CRITERION 3: PROGRAMME STRUCTURE AND CONTENT

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

The MMT curriculum was designed based on the results from the workshop that benchmarked with the Mechanical Engineering curricula of some prestigious universities in the world *[Exh.3.1: Benchmarking of the MMT programme]*, in combination with the survey results conducted from industry and labour markets *[Exh.3.2: Feedback of stakeholders in 2011]* and then modified to adapt to Vietnamese conditions. Below is a brief summary of benchmarks:

- The ELOs were made based on the Bloom's Six Levels of the cognitive domain of learning from knowledge to evaluation.

- As the ELOs consist of not only knowledge, skills but also attitudes and professional ethics, beside courses in campus the student's learning activities in real situation are needed.

- The division of knowledge in the programme is balanced and effective. Knowledge is arranged from low to advanced levels.

The courses were integrated and cohesively designed *[Appendix 3: Curriculum map]*. With the linkage among courses, students know what stage of the programme they are currently in, and propose their own study plan for the following semesters.

The courses make evidential contributions in achieving the ELOs. See *the Appendix 2 (Matrix of courses vs. Expected learning outcomes of MMT programme)* to know how to progress the ELOs through the courses with the different cognitive levels of Bloom's taxonomy. The ELOs are also transferred into the CLOs which can be achieved by the contents of the courses, teaching and learning approaches, and diverse assessment methods *[Exh.3.3: Course syllabi]*.

Teaching and assessment strategies are documented in course syllabus *[Exh.3.3: Course syllabi]*. Strategies for teaching and assessment to align constructively with ELOs include:

- Applying active learning (student-oriented and problem-based methods) and information and communication technology for blended learning *[website: http://lms.hcmute.edu.vn]*.

- Theory incorporates with practice. Each specialized course has its practical course to help students master the knowledge, such as course "Pneumatic & Hydraulic Technology" is followed with "Experiments on Pneumatic & Hydraulic Technology" and course "Automation of Manufacturing Process" and "Experiments on Automation of Manufacturing Process" go together, etc.

- Various types of assessment in formative and summative help students consolidate their knowledge, apply theory into practice/research and accumulate them to achieve the ELOs (see more in Criterion 5).

- The educational organization closely collaborates with local organizations and industries.

- Teaching activities incorporates with research and technology transfer *[Exh.3.4: MMT students' and lecturers' scientific projects]*.

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

The contribution of each course to achieve the programme ELOs is clearly reflected in the various course syllabi and illustrated in Appendix 2 *(Matrix of courses vs. Expected learning outcomes of MMT programme)*. The ELOs of the programme are translated into CLOs through the academic staff's discussions in designing the course specification. Some courses will contribute to achieve ELOs with various levels, from partly-supportive, supportive to highly-supportive and each course can support from 2 to 5 ELOs. For example, the successful completion of some courses help students achieve ELO 5 and 6 (generic skills) through oral presentations and project-based

teamwork activities with various levels from the first semester (course "Introduction to Mechanical Engineering") to the last one (Capstone project).

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

The duration for the whole programme is 4 years, consists of 58 courses with 150 credits in total, and is divided into two blocks including general knowledge (57 credits in the first three semesters) and professional knowledge block (93 credits including 10 credits of capstone project in the last five semesters). The programme is flexible enough to help students easily plan the time to complete it *[Appendix 2]*.

The cornerstone of the MMT programme which lasts for the first five semesters is required for all MMT students. From the sixth semester, students are allowed to choose one of two specific options: *(1)* **Machine Manufacturing Technology***;* or *(2)* **Machine Design**. In either option, a student takes several elective courses in addition to the compulsory ones to complete the programme.

The network of courses of the MMT programme is shown in the Curriculum map *[Appendix 3]*. The programme specification constructs a map for the ELOs in terms of knowledge, skills, and attitudes. The connection between knowledge blocks, from the general knowledge to the professional knowledge with detailed information about courses constructed in the programme helps students know which one they have accumulated and what courses offered in the following semesters. From that, it is easy for them to make their own learning plan to achieve the best results.

The MMT programme structure indicates a clear relationship among the courses. The duration and sequence of each course are logically designed. The programme also provides a clear description on how the first year programme provides foundation training for the following years. For example, the students must complete courses of Descriptive Geometry & Technical Drawing, Theory of Mechanics, Strength of Materials which become prerequisite courses for studying Theory of Machine and Machine design and taking the course project in the fundamental knowledge block. After completing the first project and studying some courses of the specialized knowledge (Metal Technology, Fundamentals of Machine Manufacturing Technology, etc.), students will be qualified to take the second course project (Project on Machine Manufacturing Technology) in the professional knowledge block. The two course projects as well as some other specialized courses remarkably support students to complete the capstone project in the last semester.

Meanwhile, elective courses might be considered as broadening students' knowledge. Some contents of the electives might be useful to support their learning in their major fields, while some contents might become an introduction for their further development of both professional career and postgraduate education. For instance, those who choose concentration of majoring in Machine Manufacturing Technology can register the electives that enable them to widen their knowledge into the fields such as Automation of Manufacturing Process, Electrics and Electronics in Industrial Machines, etc. On the other hand, those who major in Machinery Design can choose CAE in Machine Design, Design and Simulation of Machine Systems, etc. to enhance their designing ability in mechanical engineering *[Appendix 2]*.

Final year students need to complete the capstone project. It is an essential component in the whole training process that could:

- Give students the opportunity to consolidate and enhance the acquired knowledge and skills they have gained throughout their whole programme of study.

- Help students synthesise their learning across the programme, demonstrate holistically their development of graduate capabilities. It is also the preliminary step to apply professional awareness to solve practical problems in mechanical engineering.

- Practice professional skills of an engineer, establish the behaviour and working method for a MMT engineer in their future professional career.

- Provide an educational site for evaluation, enabling faculty staff to consider the effectiveness of the whole programme of study in an integrated and coherent way.

The MMT programme structure shows a good balance between general, fundamental and specialized knowledge (Figure 3.1).

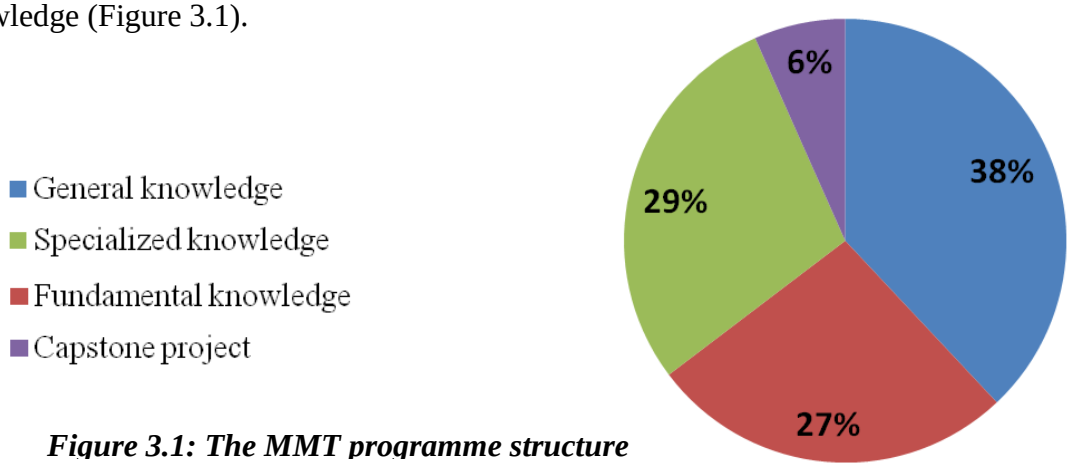


Figure 3.1: The MMT programme structure

The MMT programme shows a breadth, depth and professionalism, which fits to the diversity of individuals' purposes:

Breadth. Nearly 38% of the curriculum is general education, which accommodates students with basic knowledge in mathematics and science, technological, social, political, and ethical constraints of global society. Therefore, graduates from MMT programme can apply broad knowledge of mechanical engineering to a diverse range of careers or pursuit of graduate education.

Depth. The curriculum has core and elective courses in mechanical engineering, which provides students in-depth understanding of scientific principles, analysis and design skills to achieve success in the practice or in advanced study and research of mechanical engineering.

Professionalism. The curriculum also prepares students for professional experiences and soft skills (communication skills, critical thinking, and ability to work on multi-disciplinary teams), professional and ethical responsibility and the commitment to life-long learning in order to succeed in any working environment.

FME has paid much attention to improving and developing the quality of education and training programme towards the national and regional standards as well as international integration. Benchmarking with the other programmes, the MMT programme promotes diversity, student mobility and cross-border education *[Exh.3.1: Benchmarking of the MMT programme]*. Attending the MMT programme in HCMUTE, students may take part in student exchange programmes for short term periods in many universities who have signed MoU together with the HCMUTE. Reports from students show that such programmes are very useful for them and strongly enrich their knowing about internationalized society. Vietnam-Japan International Orientation and Education Center (VJEC) belonging to HCMUTE provides MMT graduates career opportunities to work in Japan after a free training for Japanese language *[Exh.3.5: VJEC programme]*. Additionally, they can pursue higher education (Master and PhD. Degree) or higher training as experts in mechanical engineering.

To continuously improve the quality of the programme, it is reviewed annually and then revised if necessary. The HCMUTE has an ISO procedure to build a new programme as well as to review it based on PDCA model. The procedure has four steps including making plan, organizing meetings and seminars to discuss, getting feedback from stakeholders and reviewing the programme. The MMT programme has experienced several revisions with gradual downsizing of the number of credits (from 215 credits of the 2004 programme, 186 credits of the 2008 one and 150 of the 2012 version) thanks to integration of knowledge clusters *[Exh.3.6: MMT programmes in 2004, 2008 and 2012]*.

FME has a strong linkage with its stakeholders, especially its alumni and industry partners. All changes/revisions in the programme are made based on stakeholders' feedback or the change in industry or society. For instance, due to the requirements of the knowledge and professional skill of CAD/CAM-CNC technology, the MMT programme was amended in 2015 to increase 2 credits for the course (from 3 to 5), one for theory and one for practice *[Exh.3.7: Update on the MMT programme specification in 2015]*.

The programme is required to be updated every two years based on the practical situations reflected by stakeholders during the department planning workshop. While the block of fundamental knowledge is maintained, amendment focuses on the block of specialized knowledge through elective courses. For example, compared to the 2008 programme, the 2012 programme has new elective courses such as Industrial Robots, Industrial Product Design, etc. In terms of courses, new softwares or their new versions such as SolidWork, Autodesk Inventor have been applied in designing machinery. In addition, reading materials and textbooks are also kept up-to-date.

All changes require the official approvals by the FME ASC and finally the Presidential Board.

CRITERION 4: TEACHING AND LEARNING APPROACH

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

The educational philosophy of MMT programme follows that of the FME – "Comprehensiveness, Creativeness and Ambitiousness". It is also inherited by the educational philosophy of the HCMUTE whose creativity and ambitiousness pave the way for all teaching and learning activities. They are founded on the premise that students build their own understanding of the world by investigating and experiencing on their own under the coaching of teachers. This philosophy emphasizes hand-on problem solving which is obviously proven in the amount of experiment/practice courses and course projects. This educational philosophy is propagated to students, lecturers and other stakeholders in seminars and workshops on building and amending curricula of the FME and officially posted on the Faculty's website *(http://fme.hcmute.edu.vn/)* *[Exh.4.1: Activities to articulate FME educational philosophy]*

The approved philosophy provides a guideline for the teaching and learning activities throughout the programme. First, on the student side, learning is a comprehensive process of searching for meaning. Therefore, students are encouraged to actively construct the meaning of the provided knowledge and concepts. Then, meaning demands understanding from general to details. And the details must be analysed in the context of wholes. Therefore, the curriculum and lecturers should emphasize on fundamental concepts, not on separated facts and figures. Finally, active learning requires students to construct their own meaning of knowledge, not memorizing skill.

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

Outcome-based teaching, along with a consistency in educational philosophy, ensures that the MMT programme is constructively aligned with the ELOs. In every course, lecturers have to set CLOs mapped to some ELOs that have been assigned by the Department. Teachers are free to choose teaching materials, teaching methods and assessments as long as their decision ensures for the acquirement of the CLOs. However, everything has to be documented in the syllabus and course portfolio and discussed at the end of every semester to search for any improvement if needed. The curriculum of the MMT programme, the teaching-learning methods and various assessment approaches are designed to adapt to the chronological development of the students. The courses of MMT programme raise students' cognition levels from low-order thinking to higher one *[Exh.4.2: Sample of course's portfolio]*.

The teaching and learning strategies which enable students to acquire and use knowledge academically are arranged in a hierarchy from simplicity to complexity with the assistance from

other departments. Firstly, direct instruction by means of lecturing and demonstrating approaches with factual examples is normally used in the first year to teach mathematics and natural science courses. They prepare students with solid background of mathematics and general sciences to learn fundamental and specialized courses in the following years as well as for their life-long learning. These courses are provided by the Faculty of Applied Sciences. Then fundamental knowledge is taught in the second year when theories are applied into practice. Indirect instruction or inquiry-based learning is encouraged which teaches theory combined with laboratory experiments, workshop practice and case-studies. Students are enabled to apply theory to different contexts under teachers' guidance. In this stage, the MMT programme receives noticeable contribution from other departments in the FME. During the teaching process, there are always careful discussions among lecturers from different departments related to interdisciplinary courses taught to the MMT students in order to ensure for a smooth transition among different fields. Finally, it is the independent study. Previously studied knowledge from other departments serves as a solid background for MMT students. They practice constructing the meaning of specialized knowledge in mechanical engineering, manufacturing and industrial automation to solve engineering problems in course projects, factory internship and capstone project *[Exh.4.3: Teaching provided by different departments for MMT programme]*.

In order to enhance the training of MMT students as well as providing them essential professional skills, this programme applies a lot of cooperative learning methods: learning duet, think-pair-share, jigsaw, video demonstration, case study, group activities, desktop project, project-based learning. Lecturers are encouraged to use at least three different teaching methods in their courses. These teaching methods are often shared by senior lecturers in the department who have received specialized pedagogical trainings from either national or foreign institutions. Lecturers who have earned the HEEAP trainings in USA also shared their teaching and learning experience to others. They often attend the annual Vietnam Engineering Education Conference (VEEC) to share and learn new methods from the HEEAP alumni community. A prominent example of applying active learning integrated with project-based learning is the "Introduction to Mechanical Engineering" course *[Exh.4.4: Variety of active teaching methods]*.

Besides interactive teaching methods, technology is also an encouraging tool that the MMT programme embraces to make the 21st-century students' learning more engaging. Most classrooms are equipped with projectors, LCD TVs and/or Wi-Fi system which facilitate the usage of PowerPoint lectures and the online learning management system (LMS). Complicated engineering prototypes and devices are simulated and analysed by professional engineering softwares in advance in theory classes before students can experience physical devices in the laboratory. These tools help students understand their lessons thoroughly. Additionally, HCMUTE is proud to be one of the leading universities in Vietnam successfully implementing the LMS. The innovative LMS of HCMUTE *[http://lms.hcmute.edu.vn]* provides students with instant access to teaching materials and efficient interaction with teachers and other students. Besides adequate laboratories and school workshops with modern facilities, students can also interact with contemporary industrial machines and equipment. To keep pace with the rapid advance of technology, the FME also usually holds trainings for lecturers whenever new technology is introduced or new facilities are equipped for the faculty *[Exh.4.5: Technology used in the instruction]*.

Open learning space, library with thousands of books and Open Lab are also a favourite model that HCMUTE and FME are applying to create a more convenient, cooperative and supportive learning environment. Besides all the above activities provided by the faculties, whenever students need advice they can also contact the supervising teams via the FME's website *[Exh.4.6: Supportive environment]*.

One of the key missions of the FME is to provide high quality technical manpower for the national industrialization and modernization, and practical training is a compulsory part of the MMT programme. An adequate time of practical training (including lab experiments, workshop practice and factory internship) is designed to prepare students with most work-ready skills for their future

career. Factory visiting is also a regular activity that the Department holds to help students to catch up with practical working environment. The FME and particularly the MMT Department are mainly in charge of holding regular trainings for teachers of vocational schools under the designation of MoET. Short training programmes on CNC manufacturing technology is also a popular service that the High Tech Center provides to the communities whose learners are not only the FME's students but also technicians from factories *[Exh.4.7: Practical trainings and community services]*.

Project-based learning and reflective learning are crucial factors among others that MMT programme uses to nurture and enhance the research passion and skills. From the third year, along with some course projects that students have to do, they are also encouraged to join some research groups and research labs to practice doing research with senior students. HCMUTE policy encourages and sponsors students to do research and attend national and international engineering competitions as an aspect of reflective learning. Annually, the FME holds some regular competitions as favourable destinations for students to study, exchange experience and practice design and manufacturing skills. These competitions impel all the creativity and the joy of learning *[Exh.4.8: Research activities for students]*.

In order to inspire students with passion of experiencing and exploring to motivate them with active learning process, a flexible, supportive and cooperative learning environment is necessary. The promotion of HCMUTE policy for blended learning enhances a diversity of study modes (face to face learning, online learning, project-based learning). Students of the MMT programme usually attend annual exchange programmes with some universities from Korea, Taiwan, Thailand. Meanwhile, foreign students also come to the FME to implement some joint projects or capstone projects during summers. These activities are not only enabling students to have the opportunity to exchange cultural and knowledge, but also binding relationship between the universities involved *[Exh.4.9: Activities for exchange programme of the FME]*.

Despite a number of teaching and learning activities that the MMT department holds to constructively align to the achievement of the ELOs, the management of these activities is a closed-loop process whose course syllabus and course portfolio are the first two requirements. Next, from teachers' point of view, during their work they make self-reflection through action chain "teach, analyse, evaluate and improve". Reflective teaching is also undertaken with supports among colleagues by means of teaching peer-review. Constructive recommendations related to either major or teaching approaches from senior lecturers help younger faculties to improve. Eventually, the most reliable and available source of teaching evaluation is the Student Evaluation of Teaching during their study. Lecturers can make timely adjustments whenever it is necessary. Any idea for amendment or amelioration would be discussed and revised onto the course portfolio. The previous process is observed and repeated continuously with better teaching efficiency *[Exh.4.10: Activities for the management of the teaching and learning approach]*.

4.3. Teaching and learning activities enhance life-long learning

Learning is a process not a product, and learning should last throughout the life of a person not excluding our students. Therefore, it is important to teach them learning methods and inspire them the desire to learn, critical thinking and self-study skills rather than specific knowledge and technologies. According to 8 competences of the European Referenced Framework, the MMT programme has concentrated to develop some key competences that could promote life-long learning.

The first and essential competency is communication in foreign languages. Admitted students to the programme have to take an English placement test in the beginning of the school year. If they don't meet the preliminary requirement of English, they have to take some preparation courses to improve their language skills in order to fulfil the prerequisite of later specialized courses. During their training, students practice the listening, speaking, reading and writing skills in four English courses including a technical English course. Some specialized courses for junior and senior students are taught in bilingual with English PPT presentations. Since 2016, the FME has encouraged students to

write and defend their capstone projects in English. Besides that, they can also participate in the FME's English Speaking club once a month *[Exh.4.11: English competency]*.

The MMT programme provides students with competence in mathematics, sciences and core engineering in the early two years that account for 69% of the whole programme. It shows the breadth of the curriculum that is very necessary for the last two years studying their major in depth as well as the possibility to pursue higher education or work in other engineering majors in the future.

Along with developing the interpersonal skills, digital competence is also built and gradually upgraded from course to course for MMT students. From the very first semester in the Introduction to Engineering course, students are already taught information processing skills. HCMUTE library also holds seminars for freshmen to describe the process of using computer to access their services via the internet. The MMT programme integrates a lot of computing courses: Visual Basic programming, Computer Aided Design (CAD), Computer Aided Engineering (CAE), Computer Aided Manufacturing (CAM), Manufacturing process automation with PLC. All these courses further strengthen the IT competency for students *[Exh.4.12: IT competency]*.

With a programme structure that has both breadth and depth, MMT students have a lot of choices to develop themselves. They can further conduct higher education to get either Master degree or PhD. degree in mechanical engineering. They can even switch to another relevant major such as Mechatronics Engineering (Fig. 4.1). Other alternatives are pursuing higher training to improve their career competences as good practitioners or expert practitioners.

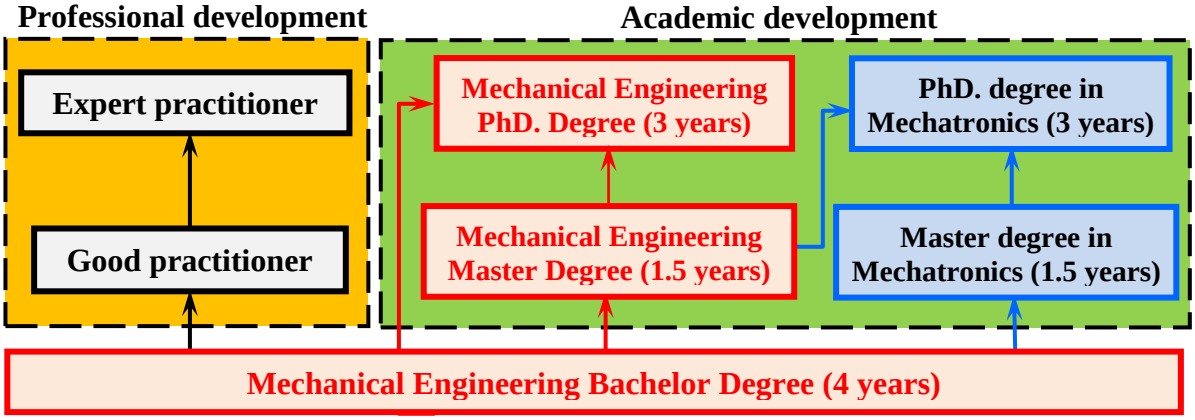


Figure 4.1: Higher education possibility for MMT students

Inspiring students the desire to learn is better than endeavouring to teach them everything. A prominent example of inspiring their learning desires is the "Introduction to Mechanical Engineering" course into which a lot of active learning, cooperative learning methods, and project-based learning are integrated. This course supplies effective learning methods that freshmen can use to adapt to their study in the university. Effective teaching strategy could also stimulate students' active learning through course projects, capstone projects and research projects. Learning through these projects is a process of problem-based learning with trial and errors. Reflective learning of students is triggered by advisors' instant feedback and comments for their performance. During that process, students undergo these action chains "define problems, analyse, evaluate, system thinking and propose possible solutions, estimate results, criticize and apply new solutions". After applying new solutions students get feedback or critique from supervisors. The above action chains repeat continuously with higher and higher demanding problems. Eventually, students establish the "habit" and "reflective analysis" competency. It is the "independent thinking" and "experience-based analysing" that will elevate their learning quality in school and intensify practical problem-solving when they go to work as well as support their life-long learning.

In order to promote the critical thinking and self-learning skills for students, from the second year, students will do some course projects under teachers' guidance. The underline pedagogic

philosophy, reflective learning, develops learners from a chain of activities: identify the problems, analyse, testing their own ideas and self-learning from experiences. Course projects, seminars and presentations always require students to search documents in the library and from the Internet, process the information, analyse and summarize their finding both in Vietnamese and in English. Then they have to present their projects, discuss and brainstorm to generate more alternative concepts/solutions *[Exh.4.13: Samples of course projects]*.

Apart from the official curriculum, Union related activities and extracurricular activities are regularly held to help students improve their communication skill, teamwork, social responsibility and leadership. Students are encouraged to participate in social activities, activities of Student Association and Youth Union or public activities. Office of Student Affairs will grade their attendance in terms of moral score in each activity in every semester. In order to encourage student to attend more extracurricular activities, this score is another important criterion to grant scholarship every semester and for graduation approval *[Exh.4.14: Extracurricular activities and assessments]*.

The competence of initiative and entrepreneurship is also well planned and promoted throughout the training of the MMT programme. HCMUTE reserves a portion of the annual research fund to support student scientific research activities. It develops independent thinking, creativeness and research ability. Factory visiting and internship is also another way to help students approach modern technologies and get a sense of testing new ideas in the enterprise environment originated from their scientific research outcomes, a start-up concept. HCMUTE has also built the Faculty of Innovation and Entrepreneurship to promote this process. Cultural awareness and expression is propagated at the beginning of every school year through the civil information supplementation week or via the HCMUTE radio broadcast channel *[Exh.4.15: The competence of initiative and entrepreneurship]*.

CRITERION 5: STUDENT ASSESSMENT

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

Student assessment of the MMT programme covers student entrance, continuous assessment of student progress, and exist test before their graduation. The new student admission of the MMT follows the regulation of MoET and HCMUTE whose enrolment takes place once a year in July. To enrol to MMT, high school candidates have to take the National High School Exam which is classified into different groups depending on their majors. The MMT programme recruits students in one of three groups: group "A" with three subjects Mathematics, Physics, and Chemistry; group "A1" with three subjects Mathematics, Physics, and English, and Group "D1" with three subjects Mathematics, Literature, and English. The cut-off entrance score to get admission to MMT differs from year to year based on the approved quota stipulated by MoET and HCMUTE. The practical MMT training programme with emphasis on English also requires new students to take an English placement test in the first semester. Depending on their actual English competency, freshmen will continue to study appropriate courses of English 1, 2, 3 or they have to take a preparatory English course if they don't meet the preliminary English requirements *[Exh.5.1: New student admission assessment]*.

Continuous assessment of student progress to ensure for the accomplishment of all ELOs is critically essential to MMT programme. First, the MMT curriculum has been well planned to arrange courses that will support every single ELO. Each course then builds its CLOs that should match to certain ELOs. The assessment schedule, content and methods are clearly written in all course syllabi *[Exh.5.2: Tools that ensure for the alignment of continuous assessment and ELOs]*.

The MMT programme applies three types of assessment: diagnostic, formative and summative. Various methods have been applied to comfort the accurate evaluation of students' progress. Diagnostic assessment is a non-marking test such as muddiest points, one-minute papers, quizzes, and concept inventories. The goal of this assessment is to gather instant feedback from students which could help lecturers to flexibly adjust their teaching contents and methods. The assessment

scheme for the formative and summative is 50% and 50%, respectively. The earlier assessment is undertaken throughout courses using a variety of methods: tests, assignments, desktop projects, presentation, and reports. Meanwhile, the later assessment can also be writing examinations, multiple choice tests, final reports, and oral-defence. No matter what methods are used in every course, the consistency of these assessments has to ensure for the achievement of all CLOs of that course. The head of the MMT Department is responsible for internally verifying the constructively alignment to the ELOs of the programme *[Exh.5.3: Different forms of assessment]*.

Obligatory exit assessments for the MMT programme are an internship and a capstone project which is the final screening of all ELOs. In the last semester, students are encouraged to have an internship in a company for at least 4 weeks. They can practice all necessary professional and generic skills as well as to be acquainted with the enterprise culture. They are also required to do a graduation thesis after they have already gained enough required credits. All the procedures for topic registration, implementation process (weekly reports, intermediate report and final defence) are publicly announced to students at the beginning of each semester. Each group of students will do their projects under the guidance of a supervisor. Eventually, students have to defend their work in front of a committee of lecturers and employers. The committee will assess their performance using a transparent criterion-based evaluation form *[Exh.5.4: Regulation and implementation of internship and capstone project]*.

Apart from the official curriculum, Union related activities and extracurricular activities are regularly held to help students improve their communication skill, teamwork, social responsibility and leadership. Students are encouraged to participate in social activities, activities of Student Association and Youth Union or public activities. Office of Student Affairs will grade their attendance in terms of moral score in each activity in every semester. In order to encourage student to attend more extracurricular activities, this score is another important criterion to grant scholarship every semester and for graduation approval *[Exh.5.5: Extracurricular activities and assessments]*.

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

Assessments and evaluations of students are not simply used to classify their performance but it should support the training efficiency of the programme. The ultimate goal is to ensure for the accomplishment of all students. Therefore, creating an overall assessment plans for effective assessment and evaluation of student outcomes attainment is crucial. Then the assessments for every single course have to synchronize and follow the roadmap of the whole programme. The department board is in charge of this duty before they authorize the lecturers to design their own assessment plans. The MMT programme follows the rule for grading the achievement of students stipulated by HCMUTE. The grading scale for students' performance is categorized in Table 5.1. *[Exh.5.6: Grading benchmark]*.

Table 5.1: Grading scale for student evaluation

Classification	**Grade**		
	Decimal scale	**Letter scale**	**4 grade scale**
Excellent	8.5 ≤ GPA ≤10	A	3.4 ≤ GPA ≤4.0
Good	7.0 ≤ GPA < 8.4	B	2.8 ≤ GPA < 3.3
Average	5.5 ≤ GPA < 6.9	C	2.2 ≤ GPA < 2.7
No passing			
Weak	4.0 ≤ GPA < 5.4	D	1.6 ≤ GPA < 2.1
Too weak	GPA < 4.0	F	GPA < 1.6

All courses in the curriculum have CLOs that must support certain ELOs of the MMT programme. The Academic Calendars specify 15 weeks of instruction and weeks for final exams. Based on these

calendars, teaching contents of each course is spread over 15 weeks and are clearly written in the course syllabus. The assessment schedule, content, weight distribution, methods, rubric, and grading scheme are also specified. Assessment methods have to be compatible with learning outcomes and agreed among lecturers. The school's assessment/examination regulations are generally based on MoET's and published in the Student Handbook. To manage these activities, the HCMUTE provides online surveys for students to observe and evaluate the teaching quality. *[Exh.5.7: Publicity of the assessment/examination regulations]*.

Teachers have to introduce their course syllabi to students at the first lecture to present the objectives of the courses as well as their contribution to the whole programme. Besides that means of communication to students, all courses of the FME must have introduction video clips that are posted to the faculty's website and LMS online system. This would help to provide preliminary information to students to choose appropriate courses for their interest and strength. During the teaching, lecturers have to announce the criteria for the evaluation or rubrics for every delivered assignment. These transparent criteria will set a target for students to attain. For formative assignments, in-class feedbacks for any misunderstanding on the knowledge are provided in the following lectures. For final exam, answers for the test have to be posted to the faculty's website one day after the test date *[Exh.5.8: The assessment and evaluation processes are communicated to students]*.

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

Since assessment is a tool to certify the attainment of ELOs, it has to ensure validity, reliability and consistency. Criterion-referenced assessment based on rubrics and marking schemes will assure that objectiveness. Rubrics are intensively used for the assessment of presentations, course projects, experiments/practices, internship and especially the capstone project. Evaluation standard will rely on these rubrics which are well planned and designed according to the requirements of each course. During the evaluation for the performance of students, lecturers have to use the same rubrics for the same course. Grading scheme with 0.25 resolution in a decimal scale is discussed among teachers. The more specific the rubric is, the less discrepant the final grade of different instructors is. A reliable grading scheme will assure for consistent results no matter when the marking is made, who makes that evaluation and by what method *[Exh.5.9: Quality assurance for assessment tools]*.

According to the ISO "procedure for composing and keeping the test confidential, replicating writing test; delivering, receiving the test and grade," instructors of course teams have to discuss in order to design consensus test contents. Test questions have to match CLOs, and they have to be shown at the end of the test sheets. The head of department or other authorized lecturers will make peer reviews to ensure for the validity of the test. Students are well aware of the evaluation criteria of the subject, the way to calculate the grade points, and they are fully instructed on the knowledge and skills to achieve those criteria. To ensure fairness, the test sheets are strictly secured before the test date. And after testing, answers for the test will be published on the faculty's website *[Exh.5.10: Procedures for composing, delivering and monitoring the test and grade]*.

All papers related to the assessment process are well documented and stored. Final exam questions and answers, and students' work are stored within 2 years in the Department. Teaching portfolios are saved by each lecturer. At the end of each semester, course teams will have meetings to discuss issues that need to be improved related to teaching materials, methods, as well as assessment tools. Improvement and action plan must be recorded to the portfolios for the next semester. Besides the usage of criterion-referenced assessment tools to ensure the fairness and objectivity, the ISO monitoring final examination procedure also requests 2 proctors in each testing room and 1 invigilator outside during test time *[Exh.5.11: ISO Monitoring final examination and appeal procedure]*.

In addition to the assessment of studying courses, extracurricular activities are also encouraged in the MMT programme to nurture the social responsibility awareness and therefore foster engineering ethics. They are assessed through voluntary and public activities. These assessment results are

necessary criteria to grant students scholarship every semester and for their graduation approval as well *[Exh.5.12: Assessment of students' social responsibility]*.

Continuous improvement is indispensable in modern education, more new effective assessment methods are tested and developed from semester to semester. The biggest change of the current curriculum in the assessment activity is process intensification rather than final check. The contribution percentage of formative assessment has been increased to 50% compared to 20-30% of the last curriculum. More open-exams are implemented to foster higher cognition lever in the Bloom Taxonomy rather than just practice the memorization skill. In some presentation practices, lecturers also allow student peer-evaluation. All rubrics are regularly amended to make them more specific and succinct.

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

Timely feedback from lectures for their students' learning attitude and results would help the students to adjust their learning methods. Due to the fact that learning is a process not a product, the school policy also emphasizes this guideline by taking account for the percentage of formative assessment to 50%. To cope with more workload for lecturers in assessments, the tutor system provided by HCMUTE helps to resolve those difficulties. These teaching assistants will register for a fixed working time that students can come and discuss issues related to lectures *[Exh.5.13: Regulations on teaching assistants]*.

For theoretical courses, students can check their in-semester assessment results that are regularly updated on the LMS system which has already been applied to all courses in the FME faculty. Discussion forums integrated in this online learning systems also allow students to post questions and receive seasonable comments from lecturers and other students for the problems related to the courses. For the end-of-semester examinations, answers for the test questions have to be posted on the FME's website within 2 days after the exams. The evaluation and grading have to be finished within 1 week since the test date and the results are announced to students via the AAO's website *[Exh.5.14: Timely feedback of student assessments]*.

For experimental and practice courses, the evaluation and assessment are implemented after each section. Students need to learn from experience from lecturers' feedback before they proceed with next sections. For course projects and capstone projects, students have to work with supervisors weekly face-to-face to report the progress. Any comments and suggestions pointed by the supervisors should be amended in the next meeting. These regular working schedules provide promptly support to students and help improve their learning *[Exh.5.15: Feedback of experimental courses and course projects]*.

5.5. Students have ready access to appeal procedure

The transparent appeal procedure also allows students to request for re-grading if they have dissatisfaction within one week after the scores have been published into the HCMUTE portal system *[http://online.hcmute.edu.vn]*. Re-grading process will be done by a different examiner whose major is also in that field. The re-grading results will be informed to students within one week. The appeal procedure for writing examination is obvious and satisfying to the students. However, if students still have any complaints they can meet the department and/or faculty boards to work it out *[Exh.5.16: Student complaint resolution procedure]*.

For the assessment of presentations, course projects, experimental and practice courses and capstone projects, rubrics are extensively used to ensure for validity, reliability and consistency of assessment activities. Course projects usually have 2 lecturers evaluate students' works which include an advisor and a reviewer. The final grade of students is the average of these two assessors. However, if the discrepancy is more than 2 points, these assessors have to discuss to clarify for the gap. The capstone projects have the assessment of the advisor and a reviewer to be approved for the defence in front of a committee which normally includes 5 assessors. The regulation of 2 points difference is also applied to any assessment step.

CRITERION 6: ACADEMIC STAFF QUALITY

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

The HCMUTE has built the strategic plans for the period of 2017-2021, extended to the year of 2025 and with a vision to 2030, leading to the era of IoT and Industry 4.0. Accordingly, the FME has our own strategic plan to effectively develop all of activities that are related to the responsibility of the FME.

During a long history of 52 years within the continuous development, the current mission of FME is to become a leading centre in majors of mechanical engineering in Vietnam and has a significant contribution to the development of mechanical engineering in Asia. It is clear that the development of academic staff is really one of the most important things. Therefore, the FME's academic staff's development plan was carefully described in terms of the following principles: promoting higher training for young staff, recruiting new highly qualified lecturers, training the professional skills for the faculty members, training the administrative procedures for managing faculties, etc. Furthermore, the FME always encourages the faculty members to apply for the titles of Professor, Senior Lecturer, and Lecturer for the quality improvement of the staff *[Exh.6.1: Academic staff planning]*.

In accordance with the regulation of Vietnamese Government, the retirement ages of female and male are 55 and 60, respectively. However, the lecturers who hold a Ph.D degree or Professor title and are still passionate about science research and teaching will be welcomed to extend the working time up to 5 or 7 years, respectively. The university regulation about pensions and subsidies for retired lecturers is clearly clarified. For resignation case, the lecturers have to submit a letter of resignation to the Human Resources Management Office (HRMO) and the decision is made within 45 days. For the lecturer's inability or making serious misconduct cases, the HCMUTE also has the rights to end the contract in terms of the termination of 45 days.

The important way to analyse the performance of FME is the self-evaluation activities, which are made by all lecturers of FME based on their teaching and researching performance. They also have a chance to be nominated for the best awards and emulation titles for the outstanding performance. Staff with excellent performance in teaching and doing researches will be also considered and nominated to higher academic titles based on the MoET's regulations *[Exh.6.2: Human resource policy related to academic staff]*.

There are totally 89 faculty members in the FME that include 19 Ph.D lecturers and 7 Associate Professors. Lecturers of the MMT department, who are selected to teach the MMT programme in terms of the specified knowledge and skills of the MMT programme, have many years of experience for educational career to fulfil the higher demand for training and researching quality. Besides, the FME has also invited prestigious lecturers from famous universities and research institutes. These visiting professors have enriched the teaching content and diversified training fields of FME.

So far the FME human resources development has been the main consideration. In recent years, the qualification of lecturers must be Ph.D degree. The FME's Recruitment Board checks the documents carefully and if the candidates satisfy the enrolment requirements, the FME will recommend them to the President. The lecturer candidates will have one year for probation. Then, HCMUTE will evaluate their performance based on the requirements of HCMUTE and MoET before signing the official labour contract.

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

The FME has a significant number of Ph.D holders in compared with the other faculties of HCMUTE and those of other universities in Vietnam. Particularly, the quality of FME lecturers is listed in Table 6.1 *[Exh.6.3: Teaching activity monitoring]*.

Table 6.1: Number of Academic staff and their FTEs (Reference date June 4, 2017)

Title	Male	Female	Total		Percentage of PhDs
			Headcounts	FTEs*	
Assoc. Professor	7	0	7	7x1=7	100%
Full-time lecturer (MMT)	18	1	19	19x1=19	42%
Full time lecturers (FME)	45	2	47	47x0.37=17.39	27.1%
Visiting professors/ lecturers	14	1	15	15x0.2=3.0	28.6%
Total	84	4	88	46.39	

(*) FTE stands for Full-Time Equivalent. This is a unit to calculate the investment of time. 1 FTE equals to 10-12 teaching and consulting hours per week (full-time employment). A staff member with a weekly appointment of 5-6 teaching and consulting hours per week is 0.5 FTE.

To enhance the quality of teaching, the staff to student ratio should be kept smaller than 25 according to MoET regulations. The detailed FTE ratio of teaching staff to students is shown in Table 6.2.

Table 6.2: Staff-to-student ratio

Academic year	Total FTEs of Academic Staff	Total FTEs of Students	Staff to student Ratio
2016-2017	46.39	829	17.9
2015-2016	47.39	871	18.4
2014-2015	45.02	888	19.7
2013-2014	43.28	817	18.9
2012-2013	42.91	649	15.1
2011-2012	38.54	504	13.1

Lecturer workload in each semester is designed based on the HCMUTE regulations, as well as the teaching demand, qualifications and the number of enrolled students *[Exh.6.4: HCMUTE financial planning and execution]*. The required workload of teaching staffs is shown in Table 6.3.

Table 6.3: The required workload of teaching staff

Academic titles	Teaching and consultant workload/year	Research workload/year	Community Service (No. Activity/year)
Assoc. Prof.	320h (10-11 teaching and consulting hours/week)	110h	4
PhD./ tenure	320h (10-11 teaching and consulting hours/week)	110h	4
Master of Science	280h (9-10 teaching and consulting hours/week)	90h	4
Engineer	280h (9-10 teaching and consulting hours/week)	90h	4

(Research equivalent hours are based on the quality of research output. For example, publishing an SCI journal paper is equivalent to 400 research hours)

In order to ensure lecturers to conduct scientific research, teaching and other activities, the HCMUTE builds Key Performance Indicators (KPIs) system. Working performance of staff is evaluated based on the KPIs. The evaluation result is considered to vote for awards, nomination, redeployment or punishment at the end of every school year. Lecturers can choose options of workloads via website *[www.kpis.hcmute.edu.vn]*, which was built to adapt to advantages of any

staff. Moreover, system management software Dashboard and scientific management software are built to evaluate the quality of teaching and scientific research respectively. At the end of school year, each staff has to do personal report that is evaluated by their direct manager *[Exh.6.5: Assessment of academic staff performance]*.

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

Human resources development is the most important key of any organization. The FME has annual recruitment plan in accordance with recruitment needs, which has clear specific requirements for each academic position. The lecturers must hold Ph.D degree and have good research and teaching profile. After the approval of the President of HCMUTE, the announcement of job recruitment is posted on the University's website and other social media.

A candidate must pass multiple rounds of testing as following: (1) dossier review, (2) direct interview and (3) teaching demonstration. Then, the interview with Recruitment Board is a very important step of recruitment procedure to make sure that he/she has a good communication skill and to know the candidate's thought about their teaching career. A successful candidate must go through probation period for at least one year. During this time, the probationary lecturer must fulfill the requirements of HCMUTE and MoET under the guidance of senior lecturers. Finally, the performance of probationary lecturer is evaluated for signing the official labour contracts *[Exh.6.6: Academic staff recruitment]*.

In order to meet the trend of globalization, the recruitment criteria have been adjusted. Before 2010, the education attainment of candidate was just required as Master's degree. In recent years, the enrolment requirements have been upgraded that only doctorate candidates who graduated from countries where English is used as the primary language could be privileged. In order to improve the quality of the academic staff, the HCMUTE has a policy to attract Ph.D degree holding candidates by offering monetary incentive *[Exh.6.4: HCMUTE financial planning and execution; Exh.6.6: Academic staff recruitment]*.

Academic staff having the excellent performance in teaching and researches will be considered and nominated to higher academic titles based on the MoET's regulations:

- Associate Professor: the candidates hold PhD degrees in the relevant fields for at least 3 years and must have at least 6-year experience in teaching. Candidates have to show high research competence with some ranking national and international publications. These ranking journals have to be in the lists of the State Council for Professor Title of Vietnam. Candidates also have to be the major member in two research projects, the supervisor of at least 2 graduated Master students and fluent in English (or other foreign languages).

- Full Professor: the candidates hold Assoc. Prof. position for at least 3 years and show their excellent research competence with lots of ranking national and international publications and successfully supervise at least 2 PhD students and fluent in English (or other foreign languages).

Promotion policies and salary increment regulation are also clearly given by the HCMUTE. The FME will organize a meeting to evaluate and vote for the best individuals to be managers of faculty such as Dean and Vice Dean of faculty, Head and Vice Head of Department according to the performance of staffs. Candidates need to meet the requirements of appointment including the professional specific competences, research achievements and management experience, etc. On the other hand, the chosen individual after voting will be awarded with salary increment ahead of time.

In order to ensure the quality of teaching, every subject is taught by at least 2 lecturers who have appropriate professional knowledge. Lecturers who hold Ph.D degree are usually assigned to theoretical subject, which they specialize in. Besides, lecturers who have high vocational skills and experience are responsible for practical subjects. In addition, to meet the workload completion

level, lecturers need to make and modify curriculum, write textbook and update lesson plan as well as instruct students in internship to companies *[Exh.6.3: Teaching activity monitoring]*.

Rights and duties of the FME staff including management criteria, teaching criteria and experience criteria are set and announced through FME homepage, email, etc., in which, Dean, Vice Dean of faculty and Head of Department must hold Ph.D degree. Every lecturer must be responsible for at least 2 subjects and at least 2 lecturers teaching a subject. Lecturers who teach the same courses have to discuss the content, assessment etc. at the beginning of the semester. It is required that Master or higher degree teachers supervise undergraduate students to do their thesis projects and research projects. Moreover, lecturers can attend some of following activities, which are based on KPIs for example organizing or attending Youth Student Club activities, setting up and keeping in contact with enterprises to lead students to visit or be the member of consultant group of education enrolment, etc. All academic staff have to take responsibility for the acts of individuals and accountable to the university and its stakeholder for the content of lectures, professional ethics as comply with intellectual property law, copyright, law of education, law of officer staffs. Besides those key staff members, older teachers with much teaching experience play a crucial role in elevating teaching quality and are highly valuable models for younger lecturers. During probation time of newly recruited lecturers (i.e., the first year of the labour contract), senior teachers are assigned to train the newcomers in preparing teaching materials and methods. Young apprentices have to participate in other teachers' classes to learn classroom management and teaching approaches. After the probation time, young lecturers have older ones visit their classes 2 to 3 times per semester to make suggestion for their improvement. Moreover, experienced teachers usually share a lot of ideas on teaching methods when the FME holds seminars and academic meetings *[Exh.6.7: Training activities for FME academic staff]*. The lecturers teaching the same course must work together to deliver consistent teaching contents and select appropriate assessment methods. Furthermore, the ELOs and the curricula of MMT programme are regularly revised based on the lecturers' opinions and evaluation *[Exh.6.8: Revising the MMT programme]*.

6.4. Competences of academic staff are identified and evaluated

The HCMUTE sets up the policies including teaching, research and service to identify and evaluate competencies of staffs and step by step enhance the quality of lecturers in terms of skills and professional knowledge and English as well. These candidates with pedagogical certificate after probation period will be approved for 3-year contract *[Exh.6.6: Academic staff recruitment]*.

In order to meet the requirements listed in the standards of lecturers, contracts and descriptions, teaching activities should be done by lecturers. Designing and delivering a coherent teaching and learning curriculum is mentioned to match the course syllabi to the outcomes of the programme. Next, lecturers are encouraged to apply a range of teaching and learning methods which use a variety of instructional media like automobile system simulation softwares, e-learning websites, Power-point lectures, etc., as well as selecting the appropriate assessment methods to achieve the ELOs. Feedbacks about lectures are often collected from students or colleagues who attend their classes. These activities are planned at the beginning of semester. After that, these feedbacks will be reflected by lecturers to improve the quality of lectures in any aspect. In addition, lecturers are supported to upgrade their teaching methods and researching skill annually. On the other hand, research and service are 2 other criteria to assess lecturers' competences. Every lecturer has to conduct research at least once a year. There are 2 kinds of research namely university level project and governmental project usually conducted by FME lecturers. Moreover, lecturers have to serve stakeholder for example organizing internship, attending Open day, etc. All of these activities are followed by KPIs system, an effective tool to evaluate the level of work completion among the staff.

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

In HCMUTE, the annual funding for training and further-training academic staffs is decided based on the analysis of data in past years, as well as the activity plan in the future. The FME lecturers are

encouraged and supported to improve their teaching and research skills, together with professional and technical skills as well. The training course should be related to the teaching activity, research activity, assessment methods, etc. The results of training course must be reported to the university at the end of course. Some typical training activities are introduced as follows:

- Long-term training: selecting and sending lecturers to study Ph.D courses in Vietnam and abroad. The scholarships sponsored by Vietnam's government (322 and 911 training programmes) are recommended for the application.

- Short-term training: training courses of pedagogical skills, professional training courses on education management, such as BUILT-IT, VULLI, and Comet projects from the USAID. In addition, curriculum design course, soft skills training on education leadership and management, and KPIs courses are selected for the training of academic staffs.

- Scientific seminars or conferences: workshop on improving research capabilities, workshop on industrial maintenance, workshop on 3D printing, etc.

- Training courses related to foreign language: English course in the Philippines, English training courses in HCMUTE, according to teacher education scheme at ILA 2020, ACET, Training courses for IELTS, advanced Communication in English course.

- Professional training courses on CNC machining, modelling with CREO, SolidWorks, CAE in Mechanical Engineering, Reverse Engineering, etc.

- Training courses related to IT: Digital teaching such as Pearson/LMS courses.

To identify the training and developmental needs of academic staff, there are 2 steps as follows:

Step 1: The FME lecturers suggest some training course based on the university development strategy. Then, the FME reviews and proposes to the University for implementing them as soon as possible *[Exh.6.7: Training activities for FME academic staff]*.

Step 2: Based on the training plan from the University, the list of participating staffs are selected considering their responsibility and submitted to the university for the final approval and implementation of training course.

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

The policy on the performance management of the HCMUE is provided for the enhancement of teaching, research and service and is clearly introduced and posted on the University's website. Based on KPIs system, the FME evaluates the performance of each academic staff. Then, the FME organizes meetings to identify the best individuals for the title of Emulators. The winners are awarded and considered for a salary increment before schedule as well. Increasing of the staffs' salary grade is revised every 2 to 3 years *[Exh.6.5: Assessment of academic staff performance]*.

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

Nowadays, it is vital for lecturers to do scientific research since it not only helps enhance teaching and learning quality but also provides knowledgeable and skilful workforce to meet the increasing local and international demand. Thus, apart from teaching, all academic staff are encouraged to take part in research projects. Recently, HCMUTE has issued a procedure for research project registration and implementation, making research work as the main lecturers' task, issued special stimulation and awards for teachers who are active in scientific research or have papers published on esteemed international journals. Furthermore, many research teams with detailed regulations to promote their activities have been formed at FME *[Exh.6.9: Research activities and related support policies]*.

There are normally 2 types of research conducted by the FME lecturers including applied research and basic research. The HCMUTE has ISO procedure for research project registration,

implementation and monitoring. Therefore, these activities meet the vision and missions of HCMUTE and FME. Level of research depends on level of project and level of registration paper. The number and quality of FME research projects are shown in Table 6.4.

Table 6.4: Number of FME lecturers' scientific research projects (2012-2016)

Level of projects	Number of Research projects					Total
	2012	2013	2014	2015	2016	
University-level lecturers' research projects	43	50	39	39	40	**211**
University-level lecturers' featured research projects	3	10	12	9	15	**49**
University-level Young lecturers' research projects	3	3	3	3	3	**15**

Many scientific publications of teachers have been published since 2012 on professional scientific journals or conferences as shown in Table 6.5 *[Appendix 6: List of publications published in the period of 2012-2017 by lecturers]*. It is clear that the quantity of published papers have been increasing significantly.

Table 6.5: Types and Number of journal publications of FME lecturers (2012-2016)

Year	Types of publication				Total
	National conference	National Journal	International conference	International journal	
2012	5	12	4	5	26
2013	7	19	6	5	37
2014	8	21	7	7	43
2015	9	34	9	6	58
2016	12	35	10	11	68

Recently, FME has gained its high rank in top paper publication rate in VN 2015 (Table 6.6) which reveals great development of FME scientific research.

Table 6.6: Top paper publication rate in VN 2015

Source: Tuoi Tre Online (http://tuoitre.vn/tin/can-biet/20150925/ket-qua-va-nang-suat-nghien-cuu-khoa-hoc-quoc-te-cua-cac-dai-hoc-viet-nam-dau-2015/974884.html)

Rank	Institution	Number of PhD. lecturer	Number of ISI paper	Publication Rate
1	FME - HCMUTE	17	7	0.41
2	Duy Tan University	122	52	0.43
3	Ton Duc Thang University	187	73	0.39
4	Hanoi University of Science and Technology	703	138	0.20
5	Can Tho University	285	57	0.20
6	VN National University - Hanoi City	881	141	0.16
7	Hanoi National University of Education	387	51	0.13
8	VN National University - HCM City	1,087	94	0.09

Note: Publication Rate = Number of ISI paper/ Number of PhD. lecturer

According to the level of research, the budget is decided to deliver to specific projects. The total of budget is estimated based on the quality of researches. A specific policy is offered for young staff to encourage their researches. The University has also created a simple procedure for lecturers to register and implement the research project and has issued the special stimulation and awards for teachers who are active in scientific research or have papers published on esteemed international journals.

In addition, plenty of research activities are also organized by FME, as following:

- Doing research projects with many sources of funding, such as national level research projects, ministry level research projects, provincial and university level research projects
- Creating distinctive research groups and research laboratories.
- Organizing the Symposium on Mechanical Engineering two times per year.
- Guiding students to participate in scientific research and science contest as well.

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

In HCMUTE, one of the most important parts of the strategic plan is the support staff planning, which is involved in not only the future development of human resource policy but also the human resource challenges. In this plan, the predictive number of support staff and its quality are clearly mentioned. The quality of supporting focuses on the sustainable improvement in terms of the management of all activities in the university by using ISO management tool *[Exh.7.1: Support staff planning]*.

In case of the faculties, the demands, development orientation and personnel plan of supporting staffs (i.e., including faculty secretary and laboratory personnel) must be clearly given in the FME strategic plan *[Exh.7.2: The FME strategic plan]*.

For the other functional offices of the University, the support staff planning is also described and clarified based on the targets/missions of the university from the short to the long terms. The staffs are encouraged to sketch out his/her plan for simultaneous working and studying to improve their professional knowledge *[Exh.7.3: HCMUTE HR report; Exh.7.4: Decision on department and center functions]*.

To meet the needs of education, research and service, the number of support staffs who have the Ph.D and Master degrees are increasing. In case of library, there are totally 17 staff members who effectively serve all of the HCMUTE lecturers and students. The detail information can be seen in Table 7.1. Most of them were trained in the librarian major with much experience and professional skills. They are effectively working and satisfying the national Librarian standards *[Exh.7.5: Library HR Planning]*. In order to satisfy the needs of lecturers and students, plan of personnel development is proposed to increase by 10% increment per year. Moreover, the survey of student satisfaction is annually made and its results show that most of them are very satisfied with the service from the HCMUTE *[Exh.7.6: Satisfaction Survey report from HCMUTE students]*.

In case of FME laboratories, the laboratory staffs are always ready to provide good services for students as well as lecturers in terms of studying and research. Currently, the FME has 20 laboratories and practice workshops that are satisfying the standard for laboratories and practice workshops. To have a good performance of the laboratories and workshops, the Directors of laboratories and workshops are carefully trained and assigned the responsibility for safely operating all equipment and machines, planning budget for renewing or replacing equipment as well. It should be noted that the Directors are usually selected from the faculty members who have many experiences and experiment skills. They may be Master's or PhD holders that are related to some specific majors. In addition, these lecturers are allowed to sketch out the Equipment

replacement/supplement budget plan every year *[Exh.7.7: Annual Equipment replacement/supplement budget plan]*. In order to update the knowledge and skills, they are encouraged to participate in national/international conferences *[Appendix 6]*. To continuously improve performance in terms of the training of practice subjects, the surveys of student's feedback are made at the end of semester *[Exh.7.8: Annual student survey results regarding subjects]*.

The policies on the retirement and resignation of the support staff are also clearly introduced and the procedure is the same as that for the academic staff planning. However, the Labour Code and Social Insurance Law are considered for the pension and subsidy situations *[Exh.7.9: HCMUTE HR policies related to support staff]*.

In case of IT facility, the Information and Network Center (INC) of HCMUTE has main responsibility to manage all computer laboratories, websites and internet system in order to maintain the performance and stability of all devices and systems. The INC has 08 members, consisting of 01 Director, 01 Vice Director, 01 website administrator, 01 network management executive and 04 technical staffs. All of them were well trained in IT and have shown their good performance in HCMUTE for a long time *[Exh. 7.10: Decisions on IT center functions]*. The HCMUTE provides many computer-equipped rooms at the relevant faculties for teaching and learning practice skills based on the IT and computerized activities. Besides, students are also provided with more than 50 internet-accessed computers in the library for studying and research.

To support student affairs, Academic Affairs Office, Student Affairs Office, Student Services Center, Faculty Consultants, Health-Care Office and other offices are involved in helping students. For freshmen, the university and FME always celebrate the Freshmen Admission Ceremony to welcome new members. After having fixed the cut-off entrance score, the HCMUTE Presidential Board, FME Dean Board with senior students organize an orientation for freshmen to introduce the university, faculties, departments, personnel and facilities. All of the essential information about the school offices are clearly introduced and consulted to freshman, such as the curricula, objectives and requirements of educational programme, higher education learning methodologies, etc., *[Exh.7.11: Service activities of support staff]*. During the study's time in the university, many kinds of consultations are provided to students by different ways, such as: direct consultation given by consulting office, consulting via website, consulting via emails, organized consulting seminar with regarded topics, and consultation via phone as well.

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

In HCMUTE, the recruitment plan is made every year. The recruitment and selection criteria for appointment, deployment and promotion are clearly clarified and announced via website of university, social networks and media. Actually, the procedure of staff recruitment has been built to obtain effective recruitment and transparency since 2007. Based on the workload and the recruitment needs proposed by each sub-unit, the recruitment needs are considered by the Office of Human Resource. This list of the recruitment needs is then sent to the President for the approval. The recruitment information is effectively announced in all kinds of social media.

Candidates have to strictly follow the evaluation steps required by the University. They have to pass multiple rounds of testing, such as IQ, English proficiency, basic informatics skill tests and face to take interviews, etc. The rights and duties of each supporting staff are clearly defined and announced according to their qualifications, experience and attitude. However, before becoming an official support staff, individuals have at least one-year probation. During this time, the support staff need to accomplish the requirements of the HRMO and related Head of Department *[Exh.7.12: Support staff recruitment, emulation and rewards for support staff]*.

At the end of the school year, the performance of support staff is considered to vote the best individuals for the Title of Emulators. These individuals are also considered to increase salary

before schedule of 3 years. Information related to salary increment is posted on the university website *[Exh.7.12: Support staff recruitment, emulation and rewards for support staff]*.

7.3. Competences of support staff are identified and evaluated

The competences of support staff are identified and evaluated in the same way with the academic staff based on the HCMUTE regulations to ensure the quality of staff. The quantity of HCMUTE support staff at each unit and their related duty are given in Table 7.1.

Table 7.1: The number of support staff (Reference date: July 30th, 2017)

Support staff	Highest Educational Attainment					Total
	High School	Bachelor's	Master's	Doctoral	Associate Professor	
Library Personnel	2	9	2			13
Laboratory Personnel			5			5
IT Personnel	3	2	2			7
Student Services Personnel		3	2			5
Faculty Advisory Group		2	9	3		14
Youth and Student Associations	12			1		13
Academic Personnel		8	3	1	1	13
Health Care Personnel	2	1				3
Administrative Personnel	2	4	2			8
Admissions-Student affairs Personnel		7	3	1		11
Public Relations Personnel		5	1			6
Science and Technology Personnel		3	2		2	7
Academic inspectorate Personnel		3	3			6
Quality Assurance Personnel		2	4			6
Equipment and maintenance Personnel	5	5	2	1		13
Facility management Personnel	2	4	2			8
HR Management Personnel		6	2		1	9
Finance and Planning Personnel	1	11	2			14
International Affairs Personnel		1	1	2		4
Digital Learning Personnel		1	2			3
Guard team's Personnel	21					21
Total	50	77	49	9	4	**189**

The laboratory staff of FME plays a vital role in supplying the best services for students' learning and conducting scientific research to ensure the curriculum's learning outcomes. Currently, the FME has many laboratories with qualification as shown in *[Appendix 1: List of Laboratories and Research Groups]*. The support staff who manages the laboratories or workshops are responsible for fixing or replacing the equipment in case of out-of-order. To encourage conducting researches, the FME sets up policies for borrowing and using equipment for those who conduct theses or researches. In HCMUTE, all of faculties and multi-functional offices must clearly define and clarify the job description, function, and tasks or responsibilities. The support staff must be professionally proficient in providing the best services for students. The list of supporting services is shown in Table 7.2.

Table 7.2: Supporting services

No.	Field of activities	Supporting units	Services
1	Academic activities	Academic Affairs	To consult students about learning fields such as course registrations, timetable adjustment.
			To consult and guide students about implementing Education law of MoET, Regulations of HCMUTE, etc.
			To consult students about withdrawing a course, choosing a course, opening courses and filing grade complaint.
			To consult students about graduation, in-debt credit, and other matters in relation to graduate certificates and qualifications
			To consult international students
		Faculty	To guide students for their personal learning planning schemes
			To consult students about choosing and registering courses each semester
			To consult students about learning methods, solving difficult problems in the learning process
			To consult and to guide students about doing researches
2	Social activities	Admissions and Student Affairs	To organize activities about regulations and processes for first-year students
			To consult students about implementing regulations of student activities, processes of training assessment, regulations of the social work programme
			To consult and support faculties in the HCMUTE entrance exam
			To consult the youth union, organize social work activities, social activity assessment
			To consult students about documents and procedures of pausing learning temporarily, re-entrancing, dropping out of university or transferring to another university
			To consult students about rewards and disciplines
		Student Service Center	To support facilities, learning environment, social extra work activities
			To organize skill clubs and other clubs
3	Physical activities	Health and Medical Service	To consult students about health, anti-disease and health insurance fees
4	Psychology	Student Service Center	To help students solve difficult life problems, family problems, sexual problems (gender problems) To consult educational and social psychology and student life.
5	Career	Public Relationship and Enterprises	To seek full-time and part-time jobs and scholarships To contact companies or enterprises to gain experience for students To organize seminars to train soft skills for students.
		Student Service Center	To consult and introduce part-time jobs to students
			To organize short-term technical training classes, soft skill classes for students.
6	Finance	Admissions	To consult students about living allowance, school fees, social

		and Student Affairs	work allowance, reduced tuition document.
			To consult students about tuition, studying scholarships and document for scholarships
			To consult students in difficult situations to borrow tuition supported by government.
7	Others	Student Service Center	To meet students daily to connect students with faculty consultants
			To organize international student festivals, friendship services and international student exchanges
		Library	To give information of the HCMUTE library to students
			To guide students to find and use documents, e-books and related services
		Dormitory	To support students in registering for dormitory and internship regulations.

The responsibilities and workloads of each support staff are designated by the University *[Exh.7.11: Service activities of support staff]*.

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

In accordance with the University policies, the support staffs are trained to improve professional skills, foreign language skills, information technology and specialized skills, etc. They are encouraged to attend short-term and long-term training programmes with typical activities as follows:

- Master's or PhD courses with the major appropriate to the current job positions.

- Training courses related to service activities: office-work training, soft-skill training, training courses on effective working capacity, etc.

- Professional training courses on education management: KPIs training courses, Moodle training courses, training courses for leaders on quality assurance, etc.

- Training courses related to foreign language: English courses at English centres, English training courses for support staff at the University, English training courses in the Philippines and India, etc.

- Professional training such as courses on book binding technology, digital library development, utilization of electronic resources, etc.

There are two ways to identify the training and developmental needs of the support staffs as follows:

- Deriving from the University development strategy, the training and developmental needs of support staff are identified and fulfilled every year.

- Deriving from the staff aspiration of training and development proposed to the University *[Exh.7.13: Training activities for support staff]*.

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

At the end of the semester, all support staff carry out the self-assessment report so that each sub-unit evaluates the performance based on the level of the work complement to vote for the title of Emulators. The individuals will be commended and awarded and considered for salary increment ahead of schedule. There are typical policies on performance management for support staff as follows:

- Support staff awarded with "emulative titles at University level or Ministry level" will be rewarded with money and considered for increasing salary before schedule.

- The University has policies to encourage and reward appropriately for staff who get higher emulation titles such as Government Certificate of Merit, the Labor Medals (First, Second or Third Class by the State), etc.

- Support staff with excellent achievements in service activities will be awarded certificates of merit or monetary support *[Exh.7.12: Support staff recruitment, emulation and rewards for support staff]*.

Furthermore, to improve the performance management, the University also organizes staff and key staff conference annually and conducts surveys on the working environment once a year since 2014 as well.

CRITERION 8: STUDENT QUALITY AND SUPPORT

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

The student intake policy and the admission criteria to the MMT follow the regulation of MoET and HCMUTE *[Exh. 8.1: Student admission]* and is described as below:

Before 2015, the main source of admission to MMT was high school candidates who passed the National High School Graduation Examination in July, then were classified into different groups depending on their majors. The MMT programme admits students in one of three groups: group "A" with three subjects Mathematics, Physics, and Chemistry; group "A1" with three subjects Mathematics, Physics, and English, and Group "D1" with three subjects Mathematics, Literature, and English. The cut-off entrance score to get admission to MMT differs from year to year based on the approved quota stipulated by MoET and HCMUTE. Since 2015, however, the enrolment to MMT has been expanded to other sources to directly recruit excellent candidates including:

✓ 20% of the admission quota for excellent candidates from Gifted High Schools and high quality schools in Vietnam (listed on the HCMUTE admission website).

✓ High school candidates who have achieved awards of the National Excellent Examinations or participated in the International Olympic Contests.

✓ 20% of the admission quota of the English Pedagogical and English Language Programme for candidates who have passed the National high school graduation examination and have English proficiency certification that corresponds to 5.5 IELTS grade.

Together with those intake policies, HCMUTE also provides different financial supports at the beginning and during the training programme of students:

✓ Two students who have got the top highest score in every programme based on their National High School Graduation Examination results will receive scholarship from HCMUTE if the total score is greater than 25. The scholarship is equal to the multiplication of the total score to one million VND.

✓ Full tuition exemption will be applied to excellent students for their outstanding academic scores in every single semester.

✓ Half of the tuition fees will be exempted to all female engineering students.

Thanks to the strategy of the President Board, the HCMUTE holds the well-known Open Day which invites more than 5000 high-school students to visit the campus every year. They will have a chance to talk and interact with Dean Boards and Department heads of all majors to have a better view for their future career orientation. The consultant boards will clearly explain the methods to apply and get admission information through various channels such as Press release and desk consultancy in the campus. Students in remote areas can also receive online consultancy or visit the websites of the university and FME *[Exh. 8.2: Plans for Open-days and related images]*.

Figure 8.1: The Open Day at HCMUTE

Enrolment consultancy should be timely, available and noteworthy. In 2016, HCMUTE warmly inaugurated the UTE-TV channel whereas the FME also founded the Office of Press and Media. These centres frequently organize talks with the University President, Faculty Deans and Heads of Departments to inform the newest intake policies and admission criteria, tuition fees, scholarships, school services, training programmes and other necessary information for high school students. Students can make relevant questions and watch live talks through YouTube site every Thursday evening. Moreover, HCMUTE together with MoET and some newspapers, such as Tuoi Tre, Thanh Nien, etc., regularly organize these activities.

Figure 8.2: Admission consultant of HCMUTE with slogan "Study at HCMUTE, no worry of unemployment"

The MMT students have to sit for an English exam in the first semester or submit an international English certificate, such as TOEIC, IELTS or TOEFL to be officially accepted into the programme. Depending on their actual English competency, freshmen will continue to study appropriate courses of English 1, 2 and 3 or they have to take a preparatory English course if they don't meet the preliminary English requirements *[Exh. 8.3:Decision of English proficiency qualification and grading transfer for English credit]*

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

The methods and criteria for the selection of students to MMT programme follow the intake policies of HCMUTE. Different sources of admission give candidates more alternatives to seize their opportunities to study in MMT programme. While the main source of candidates depends on their National High School Graduation Examination scores of group A, A1 and D1, excellent candidates from High Schools for the Gifted and winners of International Olympic Awards could be directly admitted to the programme. However, the number of admission to the programme is confined to the following requirements:

✓ The cut-off score must be higher than the regulated scores of MoET.

✓ The total admitted number of students to the programme is determined by HCMUTE based on the training capability and labour market's needs.

A good training curriculum could turn any student to a work-ready engineer for employers. However, an excellent programme leaves a competitive playground for the talents. The FME and MMT department take all chances to build their reputation to attract excellent students. Moreover, as an active member of HEEAP community, HCMUTE has the responsibility to diversify the engineering working environment by attracting more female students to this field. Half tuition waiver is one of the many policies that HCMUTE applies for female students in engineering programmes. Thanks to all those efforts, the cut-off scores to the MMT programme of HCMUTE from 2011 to 2016 have increased remarkably when it is benchmarked against those of other institutions, as seen in Table 8.1 *[Exh. 8.4: MMT programme's cut-off scores]*.

Table 8.1: Cut-off scores (group A) of the MMT programme compared with other prestigious universities

Cohort year	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
HCMUTE	14.5	14	17.5	19.5	22.75	22.25
HCMUT – VNU[1]	17	18.5	22	21	24.5	23.75
IUH[2]	13	14	15	16.5	20.5	16.5
HUTECH[3]	13	13	13	13	15	15
National cut-off score	13	13	13	14	15	15

[1] *Ho Chi Minh City University of Technology – Vietnam National University*

[2] *Industrial University of Ho Chi Minh City*

[3] *Ho Chi Minh City University of Technology*

Another amazing thing is that the quality of students applying for the MMT programme, as described in Figure 8.1, improved significantly from 2011 to 2016. Clearly, the cut-off scores of the MMT programme is higher than those of some prestigious universities including IUH and HUTECH.

The reported numbers of the intakes in recent academic years are shown in Table 8.2. It shows that the number of offers for the MMT programme remarkably rose during the time from 2010 to 2013 as a result of the high demand on MMT engineers. Since 2014, this number has been reduced and tent to stabilize the quantity and increase the quality of intakes. This helps the university and faculty to develop more efficient policies and a better learning and teaching environment. By monitoring the number of students enrolled and studying at the MMT programme, we can evaluate correctly the effectiveness of the methods and criteria to increase the quality of the intakes *[Exh. 8.5: Statistics of the number of students from 2006 to 2016]*.

Table 8.2: Intake of First-Year Students in recent academic years

Academic year	**Applicants**		
	No. Applied	**No. Offered**	**No. Admitted/Enrolled**
2016-2017		204	201
2015-2016	-	260	215
2014-2015	-	350	267
2013-2014	1737	350	357
2012-2013	2110	350	287
2011-2012	1159	300	230
2010-2011	1097	250	169

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

HCMUTE built an effective system for parents, lecturers, executives, as well as students to manage student progress, academic competence, and amount of work. The system is known as the University Information System (UIS) that can be found on the website http://online.hcmute.edu.vn/.

It is very useful of the website not only in helping students but also lecturers to monitor their courses efficiently. Through their portal accounts, students can give direct feedback via a survey to the quality of teaching for the courses they take. Lecturers can study these feedback to find any improvement that they can do to make the course better. In addition, the site also shows the students other information such as their profiles, notices from lecturers, study schedules, examination plans, detailed GPA, and accumulated credits each term or as the whole as demonstrated in Figure 8.3.Through this information, it is easier for students to appraise their study outcomes and then conduct suitable changes to make it better.

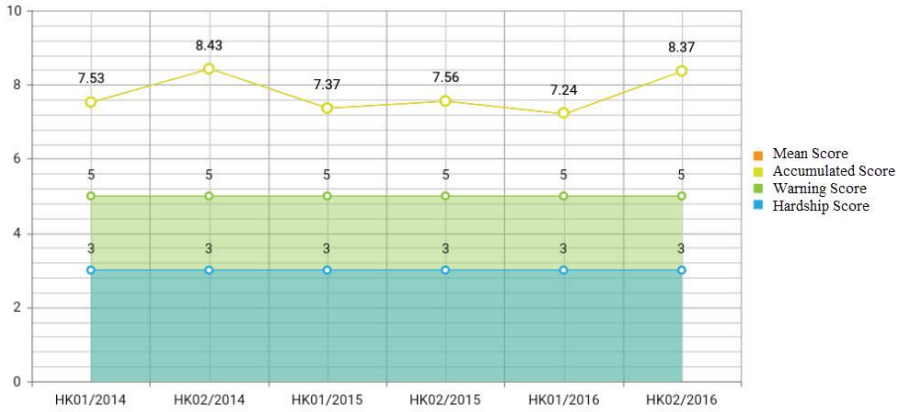


Figure 8.3: Statistics of GPA scores on a student's portal account

With the system, students can easily register or withdraw their optional and compulsory subjects based on their circumstances and abilities. It means that they are able to study more or less than the MMT programme in a semester within the HCMUTE's requirement of student's workload. Moreover, students can also use their summer time to accumulate a maximum of ten credits to assure their progress *[Exh. 8.6: Course registration]*.

Another effective system which is being used at HCMUTE to monitoring the study progress of the student is the dashboard system (*http://dashboard.hcmute.edu.vn*). With this system, administrators of the faculties can know and control the pass and dropout rates or the statistical analysis of study progress of students in a semester or an academic year (Figure 8.4). Then, they can exactly evaluate the effectiveness of teaching-learning process and give out immediate solutions to improve the situations. After finishing a term, students will receive an academic warning through emails and we will inform their parents about this result in case they cannot get a minimum score of GPA for a number of particular accumulated credits. HCMUTE is using the GPA scale of 10 or 4 to grade student's accomplishment. And the results will be uploaded on the system at the end of each semester.

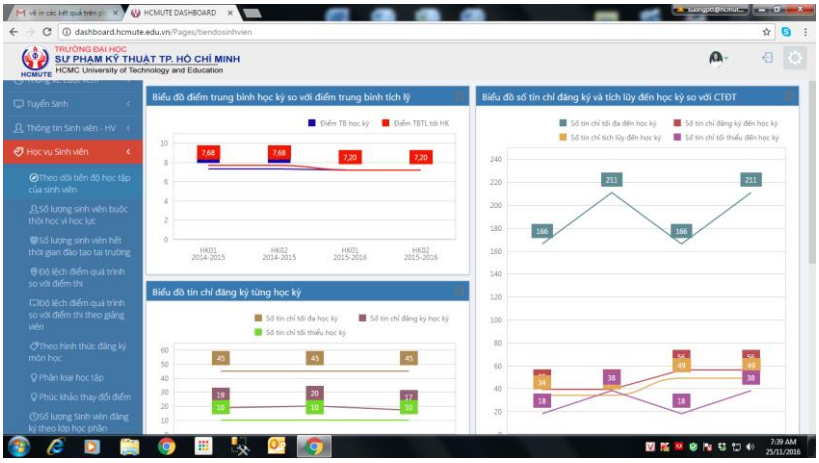


Figure 8.4: Dashboard system

In order to improve the teaching and learning efficiency, the online learning system is also applied at the HCMUTE through the LMS system (*http://lms.hcmute.edu.vn*). This online learning

environment provides a convenient tools and advance methods for teaching and learning and also helps teacher in delivering the course's contents, for example, course syllabi, textbooks, learning outcomes, detailed studying schedule, etc.

In case of the study load, the university has applied the 150-credit-based higher education system since 2012. Each credit consists of 15 class-hours and at least 30 hours of self-study. The 150-credit program is designed for eight major semesters (or four academic years). In each semester, there will be five to eight courses, that equivalents to 15-22 credits, available for the MMT students to choose, including elective courses. 57 credits are occupied by the general courses and 93 remaining credits are for the advance (major) courses. At the final semester, student will have time for doing their graduation project (10 credits). With this equally allocation of the study load, a student can arrange their yearly studying and finish the programme in a reasonable time by registering extra-courses or re-doing dismissed courses. Within the academic years, each student of the MMT programme can register for a minimum 15 credits per semester for two major semesters and maximum 10 credits for the summer semester. This ensure that every student with average learning capability can complete the programme in the planned time. Therefore, depends on their learning capability, students can finish the 150-credit programme sooner than the planned time or in case if students have personal difficulties they can extend their study within the next four years *[Exh. 8.7: Credit-based higher education programme]*.

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

There are a lot of activities from HCMUTE and FME that encourage students to study better and to enhance the employability. In addition of the academic activities, HCMUTE students can also find other support services and extracurricular activities from the Student Association, the Youth Union, Student Affairs Office, and Student Services Center. Student handbooks are also published for every academic year for student to learn about the university organizations, recently released statutes, regulations and policies or instruction for different activities, etc. *[Exh. 8.8: Student support service]*.

To help new students quickly adapt to the new environment, at the first week, all freshmen will take part in orientation day organized by HCMUTE and FME as well to receive a comprehensive explanation of everything they need to do to make their undergraduate experience complete. For instance, a campus tour aimed at introducing faculty facilities, policies, offices, faculties, departments, centres, institutes and their functions is held. In addition, we share experience about student life with them so that they will not be confused. Especially, we also hold some workshops to make them familiar with our library system and to understand the difference between studying at high school and university – sharing methods of learning effectively at university. To do this well, our FME's Youth Union plays a vital role to help the first year students quickly adapt to the new environment far from home *[Exh. 8.9: Early-programme orientation]*.

FME has an important duty that is not only supporting students from their first days at school but also following them during the time after that. For this reason, HCMUTE together with FME create a consultancy group to help them more about their studies, researches and difficulties in student's life. The FME's consultant team, including a Vice Dean, the faculty secretary, lecturers and senior students, will answer all questions as soon as possible via emails, the FME's website, or telephone. In fact, the consultancy board are always busy answering a plenty of questions during the time students register their subjects in the online system at the beginning of every semester – one week before their study. The consultants in cooperation with the AAO will advise and solve problems related to their elective and compulsory subjects, alteration of choices, or stop before the time *[Exh. 8.10: Student consultation]*. Moreover, freshmen who do not meet the English proficiency requirement can attend English classes organized by the university *[Exh. 8.11: Announcement of schedule for supplementary English classes]*.

Consultants are considered as guiders and friends as well. Therefore, any difficulties of students in their life can be shared with the group and they will help students find the best ways to solve those problems.

Annually, during two days in each academic semester, talks among students and the HCMUTE's Presidential Board, FME's Dean Board, Department Heads, will be organized to get feedback from students to understand their feelings, difficulties, and expectations. Hence, the FME is able to propose good solutions to enhance student's study and make HCMUTE and FME greater and greater *[Exh. 8.12: Talks between University/FME administrators and students]*.

To provide students with more skills and knowledge, HCMUTE and FME have founded many clubs such as Skill Club, English Club, Guitar Club, Martial Art Club, Software Club, etc. and organized a lot of seminars, workshops, job fairs and CV writing conferences. In these events, we invited professional engineers, experts, lecturers, scientists, and alumni to have talks and share their beneficial experience in practical fields. Through these talks, students are capable of strengthening their skills, work-ready skills and knowledge for a better job in the future.

Figure 8.5: The welcome ceremony and talk of the HCMUTE leaders and students

In addition, every lecturer has to register at least one day per week for being present at the MMT department office to meet students, answer their questions and give advices on students' learning problems. From the second semester of the 2016-2017 academic year, this activity will be taken into account when assessing the staff's KPIs *[Exh. 8.13: Time schedule for lecturers' duty time at the MMT department office]*.

Moreover, to enrich their knowledge and employability, students are able to take part in contests – such as Eureka, Koma Taisen, Holcim's prize, Talented Youth Scientists, National Mechanics Olympics, Asia Shell Eco-marathon, Solar Car, National Robot and Practice Skills – organised by universities, organizations and enterprises in the region *[Exh. 8.14: Student research projects and awards]*.

With great effort for many years, from the time of 2016, FME has encouraged students to do capstone projects in English. Through this work, students can improve their ability not only in MMT programme but also in presentation in English. Clearly, if students get excellent scores, they have many opportunities to receive scholarships from not only HCMUTE but also other companies and organizations.

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

The MMT students as well as the HCMUTE students have got a lot of advantage from a huge available area for doing exercise, self-studying, outside activities at the HCMUTE with many excellent supportive facilities such as libraries, dormitories, canteens, self-study areas, sport playing ground and clubs. They can join in many sport activities such as football, karate, taekwondo, Vovinam, badminton, volleyball, etc. There are also sport clubs and annual sport events for the MMT students to participate and enjoy. Every semester sports contests are held for all students by Youth Union and Student Association. The camping festival is also organized every year for students as well. Through these activities, students can improve their health and build a spirit of team building.

Besides, students are encouraged to participate in social activities such as Green Summer Volunteer Campaign, Spring Volunteer Campaign, University Entrance Exam Supporting Campaign, Blood

donation, etc., to build a spirit of taking responsibility for community. With the support and organization of the Student Services Center which started in 2013, students can easily enjoy those activities more than before. In addition, Art and music performances are also frequently organized at the HCMUTE, so that all the students can enjoy for relaxing their study stress each semester. *[Exh. 8.15: Student extracurricular activities and competitions]*.

Figure 8.6: Football competition and English speaking club with foreigners

HCMUTE always believes that student's health is the most important thing. Therefore, every single FME student' health will be examined at the beginning of each semester to make sure that they are good enough to follow the MMT programme. We currently have a modern medical station to provide students with best quality services. Additionally, HCMUTE has psychological consultants that are selected among experienced lecturers of Institute of Technical Education, helping students overcome their difficulty time during the programme and the socially psychological problems they meet *[Exh. 8.16: Student health care service]*.

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

There are two campuses of HCMUTE, including the main campus and the sub-campus, which are located on No. 01, Vo Van Ngan Street, Thu Duc district and No. 484, Le Van Viet Street, District 9, Ho Chi Minh City, Vietnam, respectively. They have a total area of 21 hectares. Furthermore, the construction area is 128,128 m^2, which involves lecture halls, classrooms, conference rooms, laboratories, study centre, workshops, 2 dormitories and 1 stadium. In details, up to 183 big size and small size classrooms, 58 laboratories, 98 workshops and 16 computer labs are equipped sufficiently with sound and light systems. The rooms, Labs and workshops are scheduled in accordance with the number of students and monitored by a supervisor. The classrooms are the most convenient ones in the university with much modern equipment. Besides the sound, light and ventilation systems, most of the rooms are equipped with projectors and cameras to supervise teaching-learning-examining process. Comparing to the requirement of classroom, the ratio of students per area is about $4m^2$ per student is fully accepted. Four buildings were built with 54,000m^2-floor including high quality building, general-purpose building, main-building and Dormitory No.2 in 2007. These buildings were planned and developed for demand of learning and research. In summary, it is indicated that HCMUTE has enough facilities and equipment for teaching, learning and research activities for both the students and lecturers *[Exh.9.1: HCMUTE Campus Information]*. Apart from the investments from the HCMUTE, the MMT department also has several projects for infrastructure such as the seminar room for post-graduate, Open Space built on the area of 500m^2 for research, library and self-studying. Especially, the LABs for specific purposes were set up according to the requirement of projects; for example, environmental Lab, Plasma Lab and Automation Lab. Moreover, the classrooms of MMT are very convenient with Internet, sound, light, projectors and cameras to supervise the teaching-learning-examining process *[Appendix 1]*.

In addition, the MMT often organized seminars or workshops about how to use modern facilities for

lecturers and students such as the workshop in using 5-axis CNC machine and Coordinate Measuring Machine. The general laboratories supervised by related Department are quite modern with annual new devices. Besides, MMT students are encouraged to take part in extracurricular academic activities to further practice with professional knowledge and skills through clubs and laboratories where students can use most of facilities of faculty. Based on the investments coming from HCMUTE budget and government- financed national programme, HCMUTE built and added plenty of classrooms, invested in infrastructure, multimedia and modern facilities which are used for teaching and research. Moreover, the HCMUTE plans to equip several devices annually with the budget of 300,000 USD per year excluding the budget for projects. In order to become a 4.0 University, the HCMUTE invested one million dollars to upgrade, develop infrastructure and apply IoT for teaching and management to meet the requirements of credit teaching system *[Exh.9.2: Plan of updating the facilities and equipment]*. With this budget, the University also applied modern teaching system such as E-learning, Mobile learning and blended learning to teaching and learning activities. Moreover, at the beginning of each semester, the HCMUTE plans to purchase devices and equipment, repair machines or fix errors and leakage of buildings. In addition, temporary repairs will also be done through a temporary procedure or online system (*http://online.hcmute.edu.vn*). For sustainable development, HCMUTE has released detailed plans with the medium vision orienting to the period 2017-2022 and will be extended to 2025. With these plans, the HCMUTE has a big budget to build classrooms, workshops and equipment to meet the change of teaching and researching. Besides, the HCMUTE has investigated the environment and services with lecturers and students since 2015. After that, the evaluation and solutions are used to promote quality of teaching and services *[Exh.9.3: FME's strategic plans]*.

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

The library is located at the centre of the main campus and it is convenient for both lecturers and students. The Library possesses both electronics and paper materials. Its total area is more than 1,430m^2 storing about 46,000 hard-copy books that are available at reading room from Vietnamese learning resources to many foreign resources in English and the others, such as French, German and Russian, etc. The number of specialized books serving for MMT field students is about 2,000 items *[Exh.9.4: HCMUTE's library resources]*. The Library annually updates new resources for students of the whole university. The readers can easily access and borrow up to 6 items every two weeks and 14 items each semester. There are thousands of electronic materials, which are textbooks, reference books, science journal articles, project reports, and dissertations in the MMT major. They are published online on the library website *http://lib.hcmute.edu.vn/* and all of lecturers and students can easily access for their purpose of self-study and research. The other important e-resources are collected and recommended by the library, such as free/paid e-database *www.cesti.gov.vn* and MIT Open Course Ware *[Exh.9.5: HCMUTE's library e-resources]*. The information of new materials is immediately informed to the readers via emails and the website.

For regularly updating the materials, each department and faculty will send the list of order materials to the library every semester. Accordingly, the library will purchase those of the materials in order to serve as fast as possible the needs of lecturers and students of the HCMUTE. Moreover, the exchange of used books for new books and book fairs activities are often opened by the library in order to give a chance to many students for accessing a various kind of materials *[Exh.9.6: Announcement of new books, book exchange and book fair]*.

To give a good exploring condition, the strong Wi-fi system is fully supplied for all of the library area, together with the application of high technologies corresponding to the IT and mobile system. Therefore, the library and the readers can quickly communicate via email, chat, message for checking and lending the books by using the homepage of library *[Exh.9.7: Library infrastructure]*.

Students can do remote access to the Library digital database and free esteemed international scientific journals from 2012 via the online webpage. Besides, the HCMUTE's library purchased 20 accounts of National Center of Communication, Science and Technology to search engineering

information and serve the important researches. For exchange of the resources, the library has joined, operated and linked to Vietnamese Library Association, Vietnam Southern College Library Association, etc. *[Exh.9.7: Library infrastructure]*.

For improving the quality of the library activities, the satisfaction surveys of readers are regularly made based on the feedback from direct interviews on every semester. Based on the results of survey, the library will take actions for continuously developing the quality of the library activities *[Exh.9.7: Library infrastructure]*.

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

There are various kinds of workshops and laboratories that can sufficiently facilitate the teaching and training, which are directly managed and supervised by related Department of the FME. Workshops and laboratories for MMT students are involved: CAD/CAM/CNC Lab, Workshops (i.e., training the mechanical manufacturing skills), Maintenance Technology Lab, Measuring Technology Lab, Electrical-Electronics Equipment Lab, Mold Technology Lab, Material Science Lab, Pneumatic and Hydraulic Lab, Process Control Lab, PLC Lab, MPS Labs, Automatic Control Lab and Robotics Lab, which are specially treated with modern and sufficient equipment *[Appendix 1]*. Moreover, the High Tech Center of the FME, which has numerous kinds of modern CNC machine and equipment that were given by a great project from Austria Government in 2002, always helps train MMT students with many experiment skills.

Recently, the FME has been sponsored with many famous companies' equipment. It costs about 500,000 USD worth equipment including a high-speed CNC machine, metal cutting machines, simulation softwares, air compressors, etc. Lab heads who were assigned to take care of the laboratories will have the responsibility to monitor the equipment.

At the beginning of each semester, the HCMUTE plans to purchase devices and equipment, repair machines through making lists of device or equipment needed to be purchased. This budget is extracted from the investment lists of the HCMUTE. Since 2012, the quantity and quality of laboratories have been updated in detail with devices and softwares, etc. The university provides fully consumed materials for practice and experiments every semester. The report of device usage effectiveness must be done annually *[Exh.9.2: Plan of updating the facilities and equipment]*.

Students are encouraged to attend conferences, exhibitions to update their knowledge and skills, and also to propose the most suitable equipment replacement to catch up with modern technologies. The HCMUTE has cooperated with Saigon High-Tech Park to get internships for students, especially Intel Corp.

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

IT and its application are mainly focused for investments from the university because of its effects on the development of the academic institutes. Therefore, all faculties and departments in the HCMUTE have been equipped with internet–connected computers. There are 1,512 computers for students and 258 projectors and LCDs for teaching. Currently, there are 52 computer clusters, with appropriate softwares to support the teaching and learning processes, such as AutoCAD, Creo-Parametric, ANSYS, SOLIDWORK, Moldex3D, DEFORM-3D, NX, etc. To satisfy the increasing need of computer use of faculty members and students, the university has established Information and Computer Center with professional IT staff. The HCMUTE has also built a PSC system which serves the learning and teaching management, assessment, asset management, library management, human resource and evaluation of students and staffs. This software is very useful and effective for storing and managing general database of any activities of the University. Each staff will receive an account of email with domain @hcmute.edu.vn to deliver and exchange information. In addition, the university informs staff via the university website *http://eoffice.hcmute.edu.vn*. On the other hand, students can register subjects, check marks, examination schedule and tuition fee, register subjects via the online system, download documentations via *http://thuvien.hcmute.edu.vn* and *https://lms.hcmute.edu.vn* *[Exh.9.8: IT facilities]*.

Apart from these websites, FME has its own website for advertising and delivering its information. Especially in March 2015, the University inaugurated a new digital learning classroom (DLC) equipped with the latest technology in video-conferencing and collaboration software and hardware. This facility allows HCMUTE to connect to Arizona State University (ASU) and other institutions of higher education around the world to create an interactive channel between faculty and students. These types of global interactions are aimed at increasing the competitiveness of HCMUTE graduates by preparing them with crucial skills needed in today's workforce, such as: team work, problem solving, project planning, presentation skills and English language training. The DLC is a 300,000 USD co-investment between HCMUTE and the HEEAP sponsors, specifically ASU, Intel and Pearson. The classroom has a capacity for 50 people arranged in seven workstations. Each one is equipped for virtual collaboration *(http://dlc.hcmute.edu.vn)*. Computers in laboratories are frequently maintained and updated. The laboratory supervisors and supporters double check every semester to make sure that all computers are ready for use in the successive semester. The staffs are always available on site to solve technical problems (if any).

To change teaching methods, HCMUTE has a great investment to Digital Learning Center *[Exh.9.9: Digital learning center]*. The university encourages lecturers to use some of the modern Teaching and Learning such as Blended learning, E/M learning. There are more than 1,000 lectures uploaded to the Internet by HCMUTE lecturers through *www.lms.hcmute.edu.vn*.

To enhance out-of-class learning activities, free high-speed internet Wi-Fi is also offered at relevant areas such as laboratories, classrooms, university hall, library, etc. Staffs and students can use Wi-Fi freely in campus. The University has sent notifications to students and staffs and users will access Wi-Fi via their email with domain @hcmute.edu.vn. Because students not only learn in classroom but also at anywhere supported with Internet, bandwidth of Internet should be enough for this kind of demand. The applications of IT are encouraged to widely use all of facilities in the university for the purpose of enhancing working effectiveness *[Exh.9.10: Application of IoT in education and management]*.

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

The environment, health and safety are always focussed during 55 years of development of HCMUTE. Since 2000, in order to have a clean and green environment, the campus area has been being completely prohibited from smoking to keep the atmosphere fresh and clean. The tidy and clean landscape of the university campus is maintained and taken care by a professional company. Health and safety are at the highest priority. Regulation and safety restriction at every laboratory/workshop must be strictly followed. At the end of each practice shift, all students are required to do cleaning for the whole workshop area. In case of emergency, the student should follow the emergency protocol, report to the lab head and call emergency number *[Exh.9.11: Regulation, pre-test, emergency protocol]*. FME laboratories and workshops are equipped quite sufficiently with standard equipment. Extinguishers are available in 100% of the laboratories and workshops. The fire prevention and extinguishment equipment is frequently tested for maintenance or replacement.

The HCMUTE Health Care Center, which has been accredited and approved by Ho Chi Minh City Department of Health, does emphasize the health and safety of teachers and students. Therefore, HCMUTE has policy of health care for staffs and students: health and accident insurances, health care and injury care are provided annually. The periodically medical examination is performed on time. The entrance health examinations for freshman students have also been given on the beginning day of the term. Moreover, the centre also offers free medical services to all of faculty members and students. It is equipped with necessary medical equipment and medicines for simple cases or first-aid for serious ones. In addition, the centre helps lecturers and students to apply for health insurance, which is compulsory to every individual. The centre periodically collaborates with local units to spray pesticide liquid. Facility Management Office supervises the cleaning process

and contract fulfilment. Students and lecturers are surveyed for their satisfaction on service quality of the Health Care Center *[Exh.9.12: Health care]*. The centre has also provided psycho-physiological advice, insurance, prevention of disease, therapeutic methods through direct consultancy, questionnaire, popularize school health to freshmen or email.

In order to have a safe campus, the security team must be on duty 24/24. The fire equipment, cameras, fence, exit signs, etc., are regularly checked and maintained for two campus of HCMUTE.

In summary, the infrastructure of HCMUTE in general and FME in specific truly well satisfies the demands of the MMT study programme. The fully equipped and updated classrooms, laboratories, workshops, libraries, computer rooms and learning spaces effectively support students' learning activities. The fresh and clean university campus is a healthy educational environment for students. Lecturers' and students' health are carefully cared.

CRITERION 10: QUALITY ENHANCEMENT

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

The MMT Department was established in 1965 and it is the oldest one in HCMUTE. For more than 52 years of founding and developing, the MMT Department has been training thousands of mechanical engineers for Vietnam. During the last decades, thanks to the blooming science and technology, the curriculum of MMT programme has also evolved tremendously to fulfil the requirements of society.

Professional organizations ask for engineers who can accommodate themselves to work in the 21st century environment. The MoET's motto "Fundamental and comprehensive innovation in education" also sets a transparent target to all training institutions. Therefore, curriculum reform is regarded as a main mission to the MMT Department. By carefully considering the requirements of labour market via annual meetings and workshops with employers and alumni, the current 2012 curriculum version has changed noticeably compared to the last 2008 version. The procedures of reviewing and revising curriculum set by the quality management system of HCMUTE also require annual meetings of teaching faculties and the FME's ASC. Last but not least, there are valuable feedbacks of students by means of surveys on teaching quality of lecturers, service quality of functional departments, and biannual meetings between students and Dean Board and Department heads, then at university level on any issues during their study in each semester. The employment survey of newly-graduated alumni after 3 months and after 1 year also forms valuable inputs for the MMT curriculum development *[Exh.10.1: Inputs & feedback of stakeholders for the curriculum development]*.

The MMT programme follows the two standard ISO procedures of HCMUTE which define an explicit PDCA process for planning, making surveys, analysing the results and proposing improvement actions for the satisfaction of stakeholders regarding the training curriculum and another procedure to evaluate the satisfaction of students during their studying time. According to those ISO regulations for revising procedure of curriculum, Dean of the FME has to work with head of MMT Department to make annual plans for updating and revising of the programme in accordance with the requirements of stakeholders through annual surveys and workshops *[Exh.10.2: UTE's ISO procedures for stakeholders' evaluation]*.

There is a clear and thorough process of the MMT curriculum design and development. From the very early stage of this process, academic staff have played a key role in formulating the ELOs of the programme whereas the head of the MMT Department is a facilitator in those round tables. After the curriculum has been officially documented in form of a programme specification, it is delivered to all faculties and students and published on the university and the faculty's websites to inform to other stakeholders who may concern. Students during their learning are allowed to provide direct feedback to the curriculum via the meetings between them and Dean Board and Department Heads at the halfway of each semester. They can also give indirect feedback for the programme by taking evaluation surveys at the end of every course that they enrol. Any curriculum

innovations needed after taking results from those activities will be initiated by head of MMT department and his teaching staff.

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

In HCMUTE, the curriculum design and development is implemented under the management of a standardized ISO procedure. This procedure was established in 2005 and it has just been revised in 2015. According to this procedure, major review period for every curriculum based on stakeholders' needs and feedback is at least once in every two years. First, MMT department head and teaching staffs are responsible for designing the curriculum. Then, consentaneous ELOs will be sent to the FME's ASC for preliminary approval before it is officially submitted to the AAO. During this process, feedbacks from all stakeholders (employers, students, alumni, academic staffs) are carefully taken into consideration *[Exh.10.3: ISO procedures for the curriculum design and development]*.

The MMT programme was designed based on the results from the workshop that benchmarked the proposed programme against the Mechanical Engineering curriculums of some prestigious universities in Vietnam and abroad. The department is also proud of being an official member of some international cooperation programmes for Vietnamese education innovation such as Higher Engineering Education Alliance Program (HEEAP), Vocational and University Leadership and Innovation Institute (VULII). The HEEAP programme has currently evolved to BUILD-IT (Building University-Industry Learning and Development through Innovation and Technology) in STEM fields (Science Technology Engineering and Maths) since 2016. More than 50% of MMT teaching staffs have participated in these programmes and received special trainings in ELOs-based or project-based curriculum design, active teaching/learning methods, creating assessment plans for effective assessment and evaluation of student outcomes attainment, etc. These trainings have been being held either in Arizona State University, USA or in some Vietnam university members since 2010- The HCMUTE also invited the Fulbright professors to train assessment methods for all lecturers. Besides the academic staff development strategies, the FME also regularly holds students exchange with other foreign institutions in Korea, Taiwan, Thailand. Meanwhile, foreign students also come to the FME to implement some joint projects during summers. These activities are not only enabling students to have the opportunity to exchange culture and knowledge, but also binding relationship between the universities involved *[Exh.10.4: International networks that the department participates]*.

Figure 10.1: Workshop on creating an assessment plan for effective assessment

In order to ensure for consistent and coherent quality assurance activities, an FME Vice Dean who is in charge of academic tasks and quality assurance will work with department heads to make plans for QA activities every semester. The AAO and QAO will help to monitor and supervise these activities. Before the implementation of any programme, the approved curriculums have to be sent to the AAO. This office will deploy teaching schedules in the curriculum before every semester via the online system. Students enrol on courses based on their own learning strategies and the head of MMT department will allocate teaching staffs depending on their expertise and workload. The

implementation of the curriculum is systematically evaluated. Annual workshops with employers and alumni are other channels to evaluate the effectiveness of the MMT programme.

The evaluation and revision of the curriculum are frequently done every 2 years and the noticeable amendment is the integrated 2012 curriculum with 150 credits compared to the last 2008 version (186 credits). Many important amendments that have been done during the last five years are summarized in Appendix 5. The latest major evaluation episode regarding the curriculum framework was in December 2015. Besides internal stakeholders that directly impact on the curriculum design and development, some other external factors and important milestones such as the participation of Vietnam into the AEC, TPP also affect the curriculum improvement process. More international engineering codes and standards are integrated into the courses. English communication and other soft skills are also strengthened throughout the programme *[Exh.10.5: Curriculum evaluation and improvement]*.

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

In order to have the teaching and learning process evaluated, the head of MMT department collaborates with the Vice Dean in charge of academic tasks and quality assurance to make systematic evaluation activities. Every semester teaching visits are scheduled for young lecturers to give timely support regarding teaching approaches and contents. Students are also encouraged to fill out the online teaching evaluation surveys for the courses they attend *[Exh.10.6: Review and evaluation of teaching quality]*.

Many modifications for the programme have been made after considering all those evaluation reports. For instance, if the previous curriculum mainly focused on teaching engineering skills, the current 2012 curriculum has general skills and self-study skill reinforced. Active learning, cooperative learning, and project-based learning methods are popularly applied for all courses. Some specialized courses in the MMT programme use bilingual materials or are taught in English to further enhance the students' English proficiency in order to align with the foreign language requirement. Moreover, the widely implementation of LMS also promotes the self-study ability of students at home whereas the face-to-face time in class is used for discussion and team work.

In HCMUTE, student assessments are strictly managed by standard ISO procedures of the QAO. All the improvements in the teaching and learning process have brought about reform to assessment. Before 2012, formative assessment accounted for 20-30% of the whole grade for a course. New programme has urged this contribution to 50% combined with the usage of different assessment methods during the teaching process. Assessment is not only a tool to certify the learners' attainment of ELOs but it also has to ensure validity, reliability and consistency of students' assessment. Criterion-referenced assessment based on rubrics and marking schemes will assure that objectiveness. Rubrics are intensively used for the assessment of presentations, course projects, experimental and practice courses and especially capstone projects *[Exh.10.7: Improvement in the teaching, learning and assessment activities]*.

10.4. Research output is used to enhance teaching and learning

Doing research to continuously innovate the technical and vocational education is one of the key missions of HCMUTE. The annual KPIs system for lecturer performance evaluates three mission groups: teaching, doing researches, and providing services. Teachers are encouraged to do researches to reinforce their majors as well as to bring the soul into their lectures. Their research outputs can also be popularized through the annual publications from either national or international papers. Besides engineering and technology researches, the MMT HEEAP alumni apply their education and training experience from Arizona State University into the programme and they also usually share their results by participating in the annual VEEC (Vietnamese Engineering Education Conference) and STEMCON (The Science, Technology, Engineering, & Math Conference) *[Exh.10.8: Research outputs of teachers support teaching]*.

The encouragement of doing research for students to improve the learning quality is also a policy of HCMUTE. Students can receive essential supports from both financial and supervising for their researches from Research Management Office. Besides doing school-level researches, MMT students have also attended national and international competitions and won a number of awards. Students' researches are vivid lectures for applying engineering knowledge to solve practical problems and lively examples of teamwork spirit *[Exh.10.9: Students' research outputs]*.

In terms of research environment, there are the two key research groups and a research lab operated by MMT professors - Mechanical and Environmental Engineering Group (GRMEE), Group of Mechanics and Energy and Industrial Machines, and CES-Plasma Lab (*http://cesplasma.vn*). They provide excellent environment for either academic staffs or students to innovate and practice their knowledge on practical projects. Senior students can attend these groups to gratify their passion for scientific research or to do their capstone projects. Many qualified machines have been developed into official teaching models (Figure 10.2).

Figure 10. 2: A 5-axis CNC milling machine capstone project

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

Curriculum is the root of the programme, but the support services and facilities are the scaffold for the tree to blossom. Despite a plentiful of support activities that the HCMUTE has organized, the evaluation of customers' satisfaction is much more crucial. First and foremost, library is the heart and soul of any educational institution. HCMUTE library provides various forms of documents along with spacious and comfortable reading environment. Librarians frequently receive trainings to deliver the most hospitable and professional services. The tracking system, the online survey, and book request service allow the library to evaluate the satisfaction of readers and to timely supplement new books.

Laboratory and workshop are indispensable to any engineering programme. The FME is proud of being an institution that possesses the best manufacturing facilities in terms of both quality and quantity in the South of Vietnam. All these high quality machines are regularly calibrated and maintained. Every year, the HCMUTE evaluates the usage efficiency of all laboratory facilities. Based on those evaluations, any upgrade or supplementation is carried out to meet the training requirements.

Any emerging education could not be detached from IT facility. In 2015, HCMUTE made enormous investment (one million US dollars) to build a digital learning centre, upgrade the internet server and buy the commercial PSC learning management system (LMS). Online learning and blended learning are so popular in the HCMUTE than ever. Students and teachers can do a lot of thing without requiring to be in school. From home, students can register or withdraw courses, attend either online or offline classes, discuss with instructors or other classmates via the LMS forums, check their grades, and make course evaluation surveys. Via the internet, teachers can check tentative teaching schedule, notify absence, register for make-up class, import courses' grade, and check student feedback summary for their courses *(http://online.hcmute.edu.vn/)*.

Student support activities from the FME are another extra credit to the programme, and they are done via the Faculty's website. Students can get consultation, check the examination answers, register for internship, apply for doing capstone projects, check all kinds of scholarship notifications, and receive recruitment notices from partners of the FME. Moreover, to further enhance the quality of students' support services, the Student Services Center (SSC), a functional

office of HCMUTE, provides skill clubs, psychology consultants, part-time job center. All the activities of SSC are regularly evaluated and subjected to enhancement *[Exh.10.10: Support services and facilities evaluation and enhancement]*.

Responding to valuable feedback of students, a lot of support services and facilities have been enhanced last year. Wi-fi system is strengthened in the Administration Hall, around the library and in some learning open spaces around the campus. No more network congestion occurs while students enrol for courses thanks to the solution of AAO. Two more new self-study areas in the basement and on the 5th floor of the Main Building were inaugurated in October 2016 and May 2017, respectively. In some lecture rooms, projectors have been replaced with LCD.

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

Thanks to the clear hierarchy ISO management system of the QAO, the stakeholders' feedback mechanisms in HCMUTE are transparent and systematic. A thorough PDCA cycle of planning, gathering information, analysing data, taking relevant action, and evaluating the enhancement of the feedback mechanism is presented in figure 10.3.

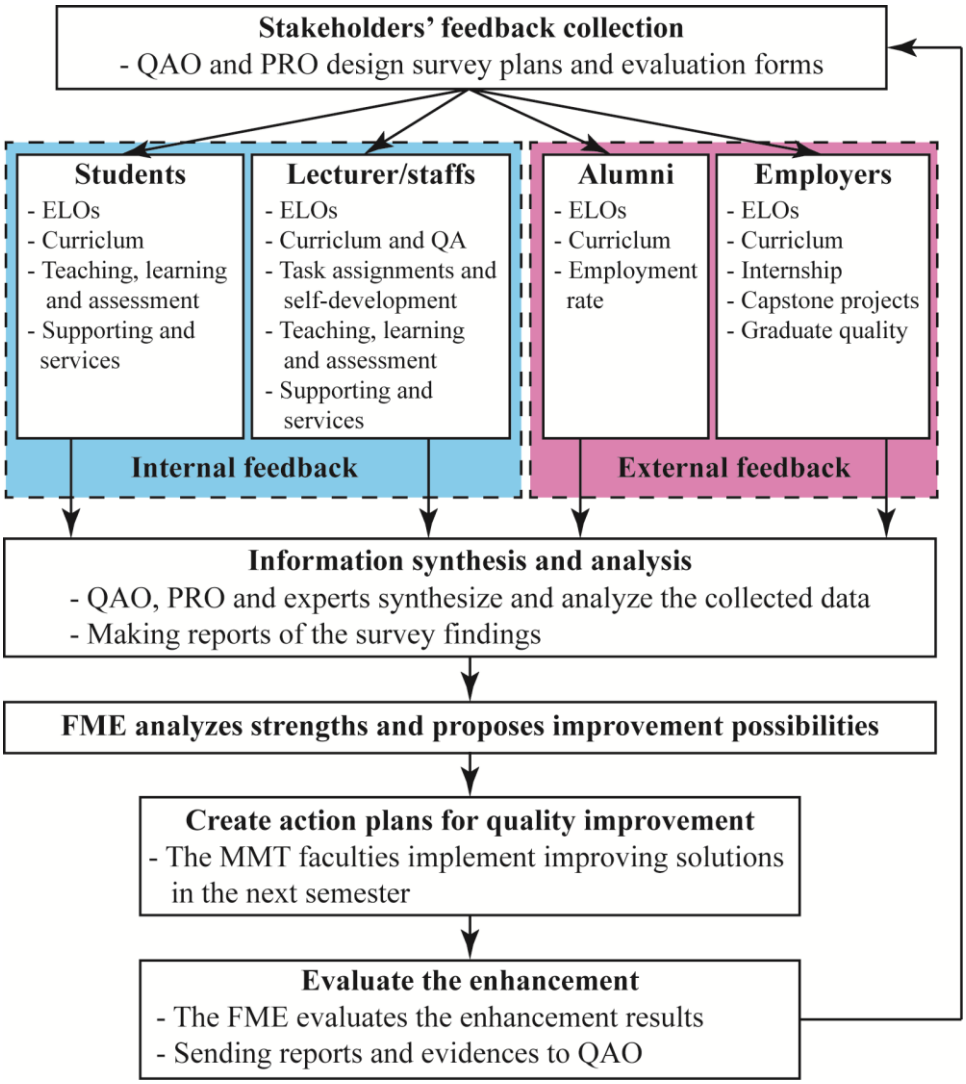


Figure 10.3: Stakeholders' survey procedure

A democratic and unique policy from HCMUTE welcomes all stakeholders to directly send email or post Facebook comments to the President's account. Informal meetings with Presidential Board on Thursday of the last week in every month are another channel to provide recommendations and feedbacks. Every year, the Human Resource Management Office (HRMO) organizes official meetings between the President and all staffs to discuss the most common concerns of the school.

Other requirements of the feedback mechanisms are validity, reliability and sufficiency. Regular online surveys on teaching quality, curriculum and employment rate, students' satisfaction on service quality, workplace satisfaction of HCMUTE's staffs implemented by QAO, AAO, and PRO are presented in Table 10.1.

Table 10.1: Types of survey

No	Survey's name	Object	Frequency/ year	Implementation time	Implementation methods
1	Teaching quality survey	All students	2	In the late of each semester	Online (PSC) *online.hcmute.edu.vn*
2	New graduates survey	Students graduating within 3 months	2	May/November	Online (PSC) *danhgia.hcmute.edu.vn*
3	Alumni survey	Students graduating at least 1 year	1	October	Online – Google form
4	Students' satisfaction on service quality survey	All students	1	January	Online (PSC) *danhgia.hcmute.edu.vn*
5	Staff satisfaction on workplace survey	All current staffs at HCMUTE	1	October	Online – Google form
6	Employers survey	Companies	1	October	Online – Google form

Besides general feedback from HCMUTE, the FME also runs its own feedback mechanism which is concentrated on different departments. The annual workshops, seminars, and meetings with employers and alumni are valuable opportunities to collect practical suggestions and recommendations for the improvement of the curricula *[Exh. 10.11: Systematic feedback mechanisms for stakeholders]*.

During the last five years, the feedback mechanism of HCMUTE have made considerable enhancement:

– Survey questions are frequently modified every semester to meet the requirements of stakeholders.

– The feedback system has been improved since 2013. With the advance of online education management system, all surveys are well organized and structured.

– New procedures require all departments have to make plan for the QA activities and report for any enhancement according to the PDCA cycle.

New sorts of survey are implemented: survey on students' satisfaction for service quality, survey on workplace satisfaction of HCMUTE staffs.

CRITERION 11: OUTPUT

The output is the ultimate goal of the training process. Thus, it is necessary to take training duration, the rate of successes and failures among the graduates, their current jobs as well as research skills into consideration for the HCMUTE and FME to get a thorough assessment of the current curricula, and then make appropriate ameliorations.

Official statistics from AAO have revealed that the percentage of timely graduates remains stable and the average length of time for a student to complete their study is proper. In addition, the rate of job placement of MMT students is always high. This fact reveals that the MMT programme fits well with the on-site working requirements. Within the recent years, many significant research projects and papers of FME lecturers and students have been published on many journals and conference proceedings. These are great evidence for the strongly developing research capability of FME.

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

Currently, at the end of every academic year, the pass rate and dropout rate have been statistically analysed by university offices such as AAO, ASAO. The final report will be then submitted to the Dean of FME faculty. Also, the training management software allows the Executive Board of each faculty to keep track of this report. Since 2014, a model of internal quality assurance according to AUN-QA has been conducted in HCMUTE. A process for data management and monitoring using the dashboard system has been run with following activities *[Exh.11.1: Dashboard system for managing student activities]*.

✓ At the beginning of each semester, the expected pass rates and dropout rates are estimated based on the ISO Corrective and preventive action procedure.

✓ The pass rates, dropout rates and graduation rates are monitored by the Faculty Dean and Deputy Deans via the Dashboard data.

✓ At the end of each academic year, the faculty analyses the given data from the university offices and writes report in order to figure out the root of low performance and propose suitable action plans to enhance the course quality in the next semesters *[Exh.11.2: FME training plan and report]*.

Moreover, since 2005, the regulations and procedures have been established by HCMUTE to monitor and enhance the pass rates and dropout rates. In order to graduate, the students have to accumulate at least 150 credits of subjects with average score greater than or equal to 5.0 in the 10-point scale *[Exh. 11.3: Training system]*. The interactions among students, lecturers and staff are promoted with an online system *(https://online.hcmute.edu.vn/)* provided by the HCMUTE. This system not only allows the students to enrol in subjects every semester, check their marks, and follow the announcements of the university, etc. but also enables the lecturers to enter marks for students at the middle and end of the course, and change teaching schedules, etc. In addition, another system named E/M Learning System *(http://lms.hcmute.edu.vn)* is available for lecturers to upload their lessons and respond to any course inquiries of the students *[Exh.11.4: Accounts and online reference]*.

Based on the statistical data from the AAO, the average pass rates over the last 11 cohorts are analysed and shown in Table 11.1 *[Exh.11.5: Pass rate and dropout rate of MMT students]*. Lateness in completing graduation practice courses and inability to obtain the required English level explained for dropout phenomenon.

Table 11.1: Pass rates and dropout rates of MMT students in last 11 cohorts

Academic year	**Cohort Size**	**% completed first degree in**			**% dropout during**			
		3 years	4 years	> 4 years	1st year	2nd year	3rd year	4th year & beyond
2016-2017	201	-	-	-	-	-	-	-
2015-2016	215	-	-	-	0	-	-	-
2014-2015	267	-	-	-	3.4	0	-	-
2013-2014	357	0	-	-	3.6	2.8	0	-
2012-2013	287	0	36.2	29.3	4.8	2.8	2.4	0
2011-2012	230	2.2	43.0	36.5	5.2	1.7	2.1	2.6
2010-2011	169	0	44.4	36.1	6.5	0.6	1.8	4
2009-2010	143	2.1	45.5	37.8	2.8	0	5.6	4.2
2008-2009	110	0	30.0	43.6	12.7	0	7.3	5.5
2007-2008	165	4.8	44.8	40.6	1.8	3.6	0	4.2
2006-2007	156	0	45.5	35.9	8.3	8.3	0	1.9

The quality target of training plan is widely announced to the academic staff by the Faculty Board of Dean at the beginning of every academic year. This plan includes the comparison of the actual and estimated pass and drop-out rates *[Exh.11.02: FME training plan and report]*. Table 11.2 illustrates the comparison results. From the table, the pass rate of FME is 80% from 2010-2012. However, it was changed a lot at about 65.5% left in 2012 because HCMUTE started to apply new assessment standard for English capability.

Table 11.2: Planned vs. Actual rates of pass and drop-out 2010-2012

Cohort	2010		2011		2012	
	Planned	Actual	Planned	Actual	Planned	Actual
Pass rate (%)	80.0	80.5	80.0	81.7	70.0	65.5
Dropout rate (%)	10.0	13.0	10.0	11.7	10.0	10.1

The pass rate of the FME students is quite similar to other faculties in the HCMUTE such as the Faculty of Vehicle and Energy Engineering (FVEE), Faculty of Civil Engineering (FCE) and Faculty of Electrical and Electronics Engineering (FEEE) as shown in Table 11.3.

Table 11.3: Comparison of pass and drop-out rates among Faculties 2006-2012

Faculty	FME	FEEE	FVEE	FCE
Pass rate (%)	79.8	75.36	74.07	73.79
Dropout rate (%)	14.4	19.44	18.39	14.22

There was a significant increase in dropout rate in 2011 and 2012 in comparison to 2010. This can be attributed to the fact that the new programme has applied higher output requirements such as English competency. Therefore, the HCMUTE and FME have put forward several solutions illustrated in Table 11.4 *[Exh.11.6: Solutions for enhancing pass rate]* in order to reduce the dropout rate.

Table 11.4: List of solutions for continuous improvement

No	Factors in need of improvement	Solutions
1	Students get into trouble with their personal life, course registration, exam preparation, extracurricular activities, lab work, financial difficulties, and psychological problems, etc.	Establish the consulting team who may meet and talk to students or answer their questions via emails, messages to solve their problems.
2	Conditions and procedure for registration of retraining	Improve the procedure for course registration for students who fail the courses using the online system
3	The dropout rate is currently high	Every semester, issue a list of students making slow progress in their study and send this list to the consulting board for further tutorials with the teaching assistants
4	The ability and knowledge of student do not meet the requirements of the training programme	Transfer students who do not achieve enough 150 credits within a given time frame to lower training levels
5	Reducing dropout rate is one of the main missions of FME	Organize periodical meetings to find the root causes and possible solutions to keep students stay interested in the major
6	Companies require the graduates to	Establish Skills and English Club to help

No	Factors in need of improvement	Solutions
	communicate well in English while a few students have struggled for the TOEIC certificate as a graduation requirement	students to increase their skills and knowledge
7	Students find some subjects hard to pass because of its specialized content	Organize course review before final examination (1 week)
8	Students must be both knowledgeable and skilful in technical fields so as to impress the recruiters or to be fully employed	Encourage students to join Technical Skills Club

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

It is noticeable that the credit-based education system has been applied at HCMUTE since 2008 *[Exh.11.7: Regulation on HCMUTE education programme]*. In a period of four years from 2008 to 2012, the MMT curriculum for undergraduate programme included 186 credits which took students approximately four and a half years to complete their study. Since 2012, as a consequence of a great shift to 150-credit programme structure, students have been able to graduate within four years only *[Exh. 11.8: MMT curriculum]*. In some special cases, students may extend their study duration to maximum eight years in total. After eight years at university, if students do not finish all of the required courses, they may be forced to stop their study. According to reported results, the percentage of on-time graduates is very stable and the average duration is from 4 to 4.5 years *[Exh.11.9: Average study duration]*. This length of time complies with the planned training period shown in students' handbook, plan for MMT training programme as well as the Statue No.43/2007 on credit-based training programme, Education Laws 2012 (Article 35: Training duration) *[Exh.11.10: Education laws 2012, Article 35]*. Table 11.5 illustrates the average graduation time of FME students.

Table 11.5: Planned vs. Actual rate of average graduation time 2008-2012

Cohort	2010		2011		2012	
	Planned	Actual	Planned	Actual	Planned	Actual
Within 4 years (%)	50	44.4	50	45.2	40	36.2
More than 4 years (%)	30	36.1	30	36.5	30	29.3

There were a reduction in the number of on-time graduates (within 4-year duration), from 44.4% in 2010 to 18.8% in 2012. This is because English language competence is added to graduation requirements in 2012, and so many students have been unable to complete their study within 4 years. This significantly contributes to the sharp fall in the quantity of graduates.

Periodical meetings among leaders, lecturers and students have been held to figure out reasons for late graduation. Some are mentioned such as difficult subjects, huge amount of time spent getting the required English certificate, lateness in course registration, part-time jobs interference, etc. Then, HCMUTE and FME have taken several actions to solve these problems as mentioned in Table 11.6 *[Exh.11.11: Solutions for improving rate of graduation]*.

Table 11.6: List of solutions to ensure graduation within 4 years

No	Factors in need of improvement	Solutions
1	Facing difficulties within the time of programme relating to student's study, social life, and psychological issues.	Building up a group of consultants to help students overcome their problems.
2	Some students feel difficult to restudy their subjects because of not passing it	Guiding students carefully how to study the subject well and opening some supporting classes to help

No	Factors in need of improvement	Solutions
	in the first time	them review related basic knowledge
3	Encouraging students to study and research more to create valuable results	Specific rewards by handing both financial supports and spiritual encouraging gifts for those who achieve great scores.
4	Students feel bored with some subjects because of lacking relation to real life applications	More optional and practical subjects are built onto the curriculum for students to have various choices
5	Students have troubles in directly registering their subjects with the AAO.	Building up the website for students to register their courses easily
6	Students use their self-study time to do part-time jobs	Emphasizing the importance of self-study in the orientation meetings and termly talks
7	Some students do not achieve the English language competence as a requirement for graduation	+ Encouraging students to take part in the existing English speaking clubs at HCMUTE such as STEP UP, ESC + Cooperating with the Youth Union to organize free TOEIC, listening and speaking classes
8	Some students cannot accumulate minimum credits per semester due to difficulties in course registration	+ Publicly announce the registration plan via faculty's websites, emails and social network. + Cooperate with AAO to help students who fail to register in their first time
9	High failure rates in tough subjects	+ Encouraging lecturers to make best use of teaching assistants to help students with classroom activities + Making course review 1 week before the final exam
10	Some students have struggled with their tuition fees and living costs.	+ Awarding faculty's scholarships for students with difficulty in financial status but have good academic results + Calling for sponsors from alumni and companies + Creating more part-time jobs for students through the Student Services Center
11	Some students have enrolled on two separate undergraduate programmes simultaneously	Consultants have talks with these students to help them arrange their time better or find suitable solutions
12	Some students use their time a lot for having part-time jobs	Working closely with students and explaining the importance of their study.

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

The employability of graduates is really important to show the efficiency of a programme. The HCMUTE has issued standard ISO procedures to collect information about the employment of graduates after 3 months and 6 months of their graduation.

The QAO has implemented two annual online surveys in June and December since 2014. It is revealed that from 2014 to 2017, 62.2% of MMT's graduates are employed within 3 months after graduation, as shown in Table 11.7 *[Exh.11.12: Results of online surveys]*.

Table 11.7: Employability rate of MMT graduates 2014-2016

Graduation time	3/2014	9/2014	3/2015	9/2015	3/2016	9/2016	3/2017
Survey time	6/2014	12/2014	6/2015	12/2015	6/2016	12/2016	6/2017
Immediately after graduation (%)	24	37	42.9	32.3	6.5	35.5	44.1
Within 1 month after graduation (%)	24	22.2	0	28	38.7	27.4	26.3
Within 3 months after graduation (%)	16	8.6	0	6.5	6.5	4.8	4.2
Still looking for a job (%)	24	29.6	28.6	24.7	19.4	14.5	13.6
Pursuing another plan in future (%)	12	2.5	28.6	8.6	29	17.7	11.9
Accumulation for duration of 3 months (%)	64	67.8	42.9	66.8	51.7	67.7	74.6
Average rate of employment (%)	62.2						

An annual online survey aimed to explore the employment status of graduates has been conducted since 2015. The survey in October 2016 indicates that their employability is at satisfactory level, approximately 95%; then, it can be inferred that the training programme has met the current demands of engineers, for not only higher quality but also greater quantity in job market *[Exh.11.12: Results of online surveys]*. Survey results also show that the rate of students' satisfaction with their jobs is as high as 77.9%.

Furthermore, Job Fairs have been organized by HCMUTE and FME in cooperation with Student Affairs Office, Student Service Center and Public Relations Office with the aim to assist students to find a job as soon as possible after their graduation *[Exh. 11.13: Job Fair Day]*.

Before their graduation, many MMT senior students have been employed due to their excellent performance during their internships. The majority of the rest has completed CVs sent to mechanical companies and prepares for job interview. Common job vacancies are design engineers, maintenance engineers and production engineers. It is clear that HCMUTE is a reliable source of educated and qualified workforce for local and international enterprises. In addition, HCMUTE students often impress the recruiters with their skills, attitude and learning ability.

Machine Manufacturing Technology is a traditional and indispensable major to any country. In developing countries, high employability of MMT engineers is obviously because of high demand on designing, manufacturing and maintenance of machine systems. Currently, employability rate of HCMUTE is generally higher than other universities in the region as shown in Table 11.8. In addition, compared to other faculties of HCMUTE, the rate of employability of MMT and FME students is similar as shown in Table 11.9 *[Exh.11.14: SAR of faculties]*. These rates indicate that the quality of training of FME and MMT meets the demand of society.

Table 11.8: Employability rate among universities after 3 months of graduation in 2015

University	**Rate of employability (%)**
HCMUTE	66.2
Other universities	50.0

Table 11.9: Comparison of the average rate of employability after 3 months of graduation among Faculties of HCMUTE

Year	**Faculty**			
	FME	**FCE**	**FVEE**	**FEEE**
2014	61.4	62.5	60.5	65.5
2015	67.1	63.5	66.6	66.2
2016	64.7	63.5	64.2	62.8

It is really important for HCMUTE and FME as well to build a good relationship with enterprises in the area. Therefore, students can get more benefits from this, such as opportunities to get internships, scholarships, and career chances in the future. We believe that FME creates more and more opportunities for students through these activities. Continuous improvement to increase the rate of employment is shown in Table 11.10.

Table 11.10: Solutions for improving the rate of employment

No	Reasons for improvement	Solutions
1	Building a good partnership between the FME and many enterprises for getting more benefits for students	Finding more related companies that can support students for their studies and future career by signing Memorandums of Understanding
2	English and specialized skills are considered as important keys for students' jobs in the future	English clubs and contests are held frequently for students to enhance professional and soft skills and English skills.
3	The FME plays a vital role in being a bridge between companies and students for practice and internship	The FME will contact relevant companies to get approvals of receiving interns
4	While theory is necessary for students, practical experience is indispensable to engineers. Moreover, companies are interested in candidates with working experience	+ Regularly organize company tours so that students can watch the actual machine operation in order to get more experience for the thesis. + Encourage students to do graduation projects instead of taking theoretical courses + Link between internship and capstone project. + Encourage students to participate in technical contests such as National Robot, practice, etc.
5	Ability to communicate in English is an advantage when students apply for a job	+ Encourage students to take part in the existing English speaking clubs at HCMUTE such as DREAM HIGH, STEP UP, ESC. + Cooperate with the Youth Union to organize free TOEIC, listening and speaking classes
6	Students should be proficient in using technical softwares to draw when designing machine	+ Cooperate with SADC to hold Technical Software Contest + Cooperate with HCMUTE Training Center to schedule evening software classes
7	Students are not confident enough in job application process so they cannot show the recruiters their strong points	+ Cooperate with the Youth Union to organize team-building games or voluntary activities + Require students to make presentations as one of course assignments
8	Students have to experience a stiff competition with graduates from other universities	+ Orientate students to practical skills which are the strong points of FME in comparison to others
9	The relationship between faculty and local businesses should be strengthened.	+ Encourage lecturers to make use of their personal relationship with alumni and company managers + Organize Job Fairs at least twice a year + Invite the employers to attend students' presentation on their capstone projects to promote direct recruitment

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

HCMUTE and FME always consider scientific researches of students as an important factor to increase student's competence and reputation of HCMUTE and FME as well. The Science and Technology Management Office (STMO) is in charge of compiling documents and guiding students to do research. The instructions of STMO deal with kinds of research, taking-part-in objects, conditions, quantity, supporting services, and award policies. Until now, FME's students have highly achieved plenty of prizes in scientific researches such as Holcim Prize, Talent Young Scientists, Solar Energy Cars, National Robot, etc. FME in specific and HCMUTE in general also stimulate all students to participate in scientific research by offering supporting policies.

FME students' research types and quantity are benchmarked against those of other faculties at HCMUTE. As can be seen from Table 11.11, the percentage of FME students taking part in research projects is higher than that of others *[Exh.11.14: SAR of faculties]*.

Table 11.11: Number of HCMUTE students' research projects 2012 – 2016

Faculty	**Number of research projects**										**Average**	
	2012		2013		2014		2015		2016			
FME	40	13.3%	20	6.7%	10	3.3%	25	8.3%	25	8.3%	**22.8**	**7.6%**
FCE	8	4.4%	11	6.1%	12	6.7%	12	6.7%	12	6.7%	**10.6**	**5.9%**
FVEE	29	9.7%	10	3.3%	12	4.0%	11	3.7%	11	3.7%	**15.0**	**5.0%**
FEEE	10	2.8%	27	7.5%	13	3.6%	45	12.5%	45	12.5%	**24.8**	**6.9%**

FCE: Faculty of Civil Engineering; FVEE: Faculty of Vehicle and Energy Engineering; FEEE: Faculty of Electrical and Electronics Engineering

Registration is available for every student who desires to do research. Students can do research individually or in a group of four under the supervision of a lecturer or researcher. The maximum duration for completing a project is one year; then evaluation and inspection process will be conducted. In case students have difficulties with their project budget, financial support from faculty will be given to ensure their concentration on the final result *[Exh.11.15. Research projects of teachers and students]*.

Annually, FME quality goals are established with certain number of research topics to be assigned to each department. Researches should aim at promoting students' motivation to study and do research. In April of each year, students should submit their project applications to the faculty for review. Then, the approved researches will be sent to STMO for registration as next academic year research projects. Those with outstanding quality will be appropriately awarded (Table 11.12).

Table 11.12: List of FME student research award

Year	**Award**	**Prize**
2017	National Robot	3rd
2016	Holcim	4th
2015	Holcim	4th
2014	Shell Eco Marathon	1st
	Holcim	4th
	MoET	3rd
2013	Eureka	3rd

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

11.5.1. Students' feedback

Students can give their feedback through the online survey conducted by the QAO at the end of each semester. The survey includes questions about teaching contents and methods, assessment approaches, pedagogical and professional behaviours, etc. From the survey results, the FME lecturers have an approximately 85% level of satisfaction. Table 11.13 shows the comparison of student satisfaction among Faculties which shows that the feedback is similar.

Table 11.13: Comparison of student satisfaction among Faculties

Year	Faculty			
	FME	**FCE**	**FVEE**	**FEEE**
2015	84.8%	84.3%	85.2%	85.8%
2016	86.6%	86.8%	87.1%	88.4%

FCE: Faculty of Civil Engineering; FVEE: Faculty of Vehicle and Energy Engineering; FEEE: Faculty of Electrical and Electronics Engineering

11.5.2. Graduates' feedback

To assess the quality of the teaching-learning activity, the FME has conducted surveys to get feedback from alumni who know and understand clearly about the efficiency of the activity including status of employment, effectiveness of the MMT programme, and the level of course satisfaction. Table 11.14 shows the comparison of satisfaction level of graduates in 2015 and 2016 among faculties *[Exh.11.16: Graduates feedback]*.

Table 11.14: Comparison of satisfaction level of graduates among Faculties

Year	Faculty			
	FME	**FCE**	**FVEE**	**FEEE**
2015	87.7%	87.7%	89.1%	88.4%
2016	86.9%	88.2%	90.2%	89.6%

FCE: Faculty of Civil Engineering; FVEE: Faculty of Vehicle and Energy Engineering; FEEE: Faculty of Electrical and Electronics Engineering

A variety of effective actions have been taken by FME based on the graduates' feedback, to enhance teaching and learning quality. For example, a consultant team has been established to support students by answering their questions, then guiding them how to solve their problems.

Furthermore, an annual Alumni Meeting Day is organized at FME office in November. It is a rare chance to ask the alumni for their opinions on the training programme via face-to-face talks or printed survey hand-outs.

11.5.3. Academic and support staff's feedback

Annually, meetings among FME Board of Deans and lecturers are organized to discuss current problems and figure out possible solutions. The Dean and Deputy Deans answer questions of the teaching staff and analyse their suggestions for better working environment. Since 2016, an annual meeting between university staff and the Board of Presidents has been scheduled with question-answer section on heated work-related issues *[Exh.11.17: Student feedback]*.

In addition, an online survey on working environment satisfaction is carried out by the QAO at the end of every academic year. The survey results are analysed and sent to the Dean Boards of all faculties at

HCMUTE so that they can find possible solutions for improvement if there is low satisfaction percentage *[Exh.11.12: Results of online surveys]*. Recently, the KPIs system has been applied to evaluate the completeness of a staff member on their given tasks. The evaluation is made by the staff themselves and their senior manager at the end of each semester. Thanks to this explicit system, the contribution of any staff member is equally and precisely assessed *[Exh. 11.18: KPIs system]*.

11.5.4. Employers' feedback

Annual meetings among HCMUTE and local businesses have been organized since 2010 with the aim to investigate the level of satisfaction of the employers on HCMUTE graduates. Compared with other faculties, FME presently has a higher satisfaction than others as shown in Table 11.15, which meet the requirements of the decree of 30c/NQ-CP promulgated on the 8th of November, 2011 *[Exh.11.19: the Decree of promugating the general programme of revolutionizing State administration]*. Another useful channel to collect the recruiters' feedback on course contents, required working skills, etc. is HCMUTE job fairs *[Exh.11.20: Stakeholders feedback]*.

Table 11.15: Comparison of satisfaction level of employers among Faculties

Year	Faculty			
	FME	**FCE**	**FVEE**	**FEEE**
2015	80.8%	78.6%	80.1%	78.4%
2016	80.9%	79.2%	78.8%	81.5%

FCE: Faculty of Civil Engineering; FVEE: Faculty of Vehicle and Energy Engineering; FEEE: Faculty of Electrical and Electronics Engineering

As seen in Table 11.15, the levels of satisfaction among FME employers recorded in 2015 and 2016 are higher than those of other Faculties.

To make our stakeholders satisfied with the policies of FME and HCMUTE, we have been trying our best to improve many things like investing in LMS system, controlling teaching-learning activities more effectively, paying much attention to lecturer's and staff officer's salary. Therefore, they will greatly contribute their efforts into the development of the university *[Exh.11.21: Continuous improvement based on stakeholders feedback]*.

PART 3: STRENGTHS AND WEAKNESSES ANALYSIS

1. Criterion 1: Expected learning outcomes

Strengths

- The ELOs of the programme are clearly formulated and are aligned with the programme objectives.
- The objectives and ELOs of the programme clearly reflect all relevant stakeholders' requirements.
- The ELOs are based on the contribution made by each course in the programme and transmitted to the students thanks to active learning methods, scientific research activities, and the nurture for lifelong learning.

Areas and plans for improvement

- The amount of feedback from stakeholders on ELOs is limited due to the strong dependence on the stakeholders' enthusiasm to make the surveys. Thus, a structured mechanism for effectively gathering feedback from stakeholders needs to be built and IEC activities to be enhanced.

2. Criterion 2: Programme specification

Strengths

- The programme specification clearly shows the ELOs and provides descriptive information how these can be achieved.
- The programme is benchmarked against the qualified national and international programmes.
- The programme specification is informative for students and stakeholders. It is widely and formally published in website and its hard copy is always available at the office of the FME.

Areas and plans for improvement

- Keep on communicating the programme specification directly to alumni and employers through annual seminars.

3. Criterion 3: Programme structure and content

Strengths

- The programme has been up-to-date and met the requirements of the stakeholders.
- The programme has a good mixture of general, fundamental, and specialized knowledge, combining theoretical and practical training which helps students adapt easily to the real working environment.
- The process of assessing and updating the programme is appropriate and well-monitored.

Areas and plans for improvement

- FME will add some elective courses such as Leadership, Public relation, Innovation to the curriculum that helps students learn and attain more soft-skills.
- FME always encourages its faculty in doing research as well as tightening the relationship industry for technology transfer. These activities help them continue updating knowledge and experience for improving the curriculum and teaching methods.

4. Criterion 4: Teaching and Learning Approach

Strengths

- Majority of MMT faculties have received extensive trainings from international cooperation projects (HEEAP, VULII, USAID-COMET, BUILD-IT) on curriculum design, modern teaching/learning methods and education innovation perspective and have successfully applied these advanced things to the programme.
- The programme applies a lot of cooperative learning and interactive teaching methods to teach professional knowledge as well as to promote interpersonal skills of students.
- The modern industrial manufacturing machines and facilities of the FME and the popularity of the online LMS system of the school help to magnify the learning and teaching quality.
- The closed quality assurance systems of the school and the FME ensure for smooth implementation and improvement of teaching and learning activities.

Areas and plans for improvement

- Full English engineering courses are limited in the programme. MMT lecturers' foreign language competency is sufficient but the students' hesitation is still existent. Gradual transition should be applied to improve the students' confidence.

5. Criterion 5: Student Assessment

Strengths

- Criterion-referenced assessments based on rubrics and marking schemes are intensively used in the programme to ensure validity, reliability and consistency of assessment activities.
- Assessment of extracurricular activities to nurture the social responsibility awareness and therefore to foster engineering ethics is also a credit to the programme.
- Employers take part in the exit assessment of students which includes both internships and capstone projects. This would equilibrate the discrepancy between the university and industry.

Areas and plans for improvement

- Online formative assessments could be widely piloted in the UTE-Moodle system to further reduce the workload of teaching staffs. However, the internet bandwidth should be improved to avoid network congestion at peak times.

6. Criterion 6: Academic staff quality

Strengths

- The number of lecturers in FME who graduated from developed countries such as Germany, Japan, Czech, Korea and Taiwan is large enough to ensure the quality of education as well as quality of research with high international publication.
- All staff of HCMUTE and FME master specific technology and are equipped with active teaching methods to conduct the curriculum.
- The policy of HCMUTE is to encourage lecturers to go abroad for degree to improve the educational quality and thereby the quality of the programme.

Areas and plans for improvement

- FME has planned to recruit more qualified staffs that hold PhD degree annually to improve the quality of staffs.

7. Criterion 7: Support staff quality

Strengths

- Support staffs are strictly recruited and well trained so that they can perform academic and administration activities effectively.

- The quality of supporting activities is evaluated by considering the periodic surveys from the students. Therefore, necessary actions will be taken to enhance the performance of supporting staff.

Areas and plans for improvement

- More support staffs need to be recruited for the development of the HCMUTE.

8. Criterion 8: Student quality and support

Strengths

- Realizing that attracting students to a university is a competitive process, HCMUTE has implemented several strategies to draw good students' attention to our university:
  - The Open Day is annually organized in January to introduce students of local high schools about the training programme and highlights of distinguished achievements and job opportunities, etc. Moreover, live interactions between the consulting board and audience on webpage or social network have been conducted to answer any questions from students or their parents.
  - Students who win the top three positions of the National Contest, National Science Contest are directly accepted to HCMUTE.

Since there are more and more students tracking to HCMUTE, the opportunity to have higher input quality and larger quantity of the students is greater.

- The learning schedule is carefully designed to assure that the study load of each semester is appropriate.
- A dashboard system has been adopted to allow lecturers to update their students' progress or make necessary ameliorations.

Areas and plans for improvement

- Many freshmen have failed to meet their English language competence requirements at the placement test. The main reason explaining for this is that most of them come from rural areas where English is not effectively taught and learned. Possible solutions are (1) encouraging students to make use of YouTube videos and webpages for their self-study, (2) organizing free courses and (3) running faculty's English club to create more opportunities of using English among students.

9. Criterion 9: Facilities and infrastructures

Strengths

- In the HCMUTE, a various kinds of modern classrooms, laboratories/ workshops, libraries and computer rooms are well-equipped and frequently updated for supporting the learning, teaching and research activities of both the students and lecturers.
- The healthy environment is kept in the campus to create fresh, clean and open spaces for students.

Areas and plans for improvement

- According to the quickly development of industry, many equipment and modern systems are needed to update for the laboratories/ workshops.

10. Criterion 10: Quality Enhancement

Strengths

- The MMT programme has a long history and large networks of alumni and employers which could help to provide a variety of perspectives for the curriculum design and development.
- Well-defined QA procedures established by QAO ensure for the validity, reliability and sufficient of feedback from stakeholders.
- Teaching staffs have new mind-set for education innovation thanks to the efforts of international cooperation programs such as HEEAP, BUID-IT, COMET and VULLI.

Areas and plans for improvement

- International publications of MMT staffs that are still limited should be improved to enhance the teaching.

11. Criterion 11: Output

Strengths

- Recently, FME students have earned their fame for being good at designing, operating machine and using technical softwares.
- The percentage of graduates fully employed within 3 and 6 months after their graduation is high. It is significant that they work in jobs related to their major – Machine Manufacturing Engineering.
- The graduates can not only work individually but also cooperate well in team work since they have joined many voluntary and extra-curricular activities hold by the Youth Union and other clubs during their programme.
- The distinguished feature of FME students is that they are able to do research in technical fields. Several graduates have their own publications right after their graduation.

Areas and plans for improvement

- Currently, MMT programme has not been accredited by international organizations. Therefore, the plan for development of FME is to be recognized by the regional (AUN) and international (ABET) organizations.

Checklist for AUN Quality Assessment at Programme Level

1	**Expected Learning Outcomes**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
1.1	The expected learning outcomes have been clearly formulated and aligned with the vision and mission of the university						x	
1.2	The expected learning outcomes cover both subject specific and generic (i.e transferable) learning outcomes						x	
1.3	The expected learning outcomes clearly reflect the requirements of the stakeholders					x		
	Overall opinion	**5.67**						
2	**Programme Specification**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
2.1	The information in the programme specification is comprehensive and up-to-date						x	
2.2	The information in the course specification is comprehensive and up-to-date						x	
2.3	The programme and course specifications are communicated and made available to the stakeholders						x	
	Overall opinion	**6.0**						
3	**Programme structure and content**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
3.1	The curriculum is designed based on constructive alignment with the expected learning outcomes					x		
3.2	The contribution made by each course to achieve the expected learning outcomes is clear						x	
3.3	The curriculum is logically structured, sequenced, integrated and up-to-date					x		
	Overall opinion	**5.33**						
4	**Teaching and Learning Approach**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
4.1	The educational philosophy is well articulated and communicated to all stakeholders					x		
4.2	Teaching and learning activities are constructively aligned to the achievement of the expected learning outcomes						x	
4.3	Teaching and learning activities enhance life-long learning					x		
	Overall opinion	**5.33**						
5	**Student Assessment**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
5.1	The student assessment is constructively aligned to the achievement of the expected learning outcomes					x		
5.2	The student assessments including timelines, methods, regulations, weight distribution, rubrics and grading are explicit and communicated to students						x	
5.3	Methods including assessment rubrics and marking schemes are used to ensure validity, reliability and fairness of student assessment						x	
5.4	Feedback of student assessment is timely and helps to improve learning					x		

5.5	Students have ready access to appeal procedure						x	
	Overall opinion	**5.60**						
6	**Academic Staff Quality**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
6.1	Academic staff planning (considering succession, promotion, re-deployment, termination, and retirement) is carried out to fulfil the needs for education, research and service						x	
6.2	Staff-to-student ratio and workload are measured and monitored to improve the quality of education, research and service					x		
6.3	Recruitment and selection criteria including ethics and academic freedom for appointment, deployment and promotion are determined and communicated					x		
6.4	Competences of academic staff are identified and evaluated					x		
6.5	Training and developmental needs of academic staff are identified and activities are implemented to fulfil them						x	
6.6	Performance management including rewards and recognition is implemented to motivate and support education, research and service						x	
6.7	The types and quantity of research activities by academic staff are established, monitored and benchmarked for improvement					x		
	Overall opinion	**5.42**						
7	**Support Staff Quality**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
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					x		
7.2	Recruitment and selection criteria for appointment, deployment and promotion are determined and communicated					x		
7.3	Competences of support staff are identified and evaluated					x		
7.4	Training and developmental needs of support staff are identified and activities are implemented to fulfil them						x	
7.5	Performance management including rewards and recognition is implemented to motivate and support education, research and service						x	
	Overall opinion	**5.40**						
8	**Student quality and support**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
8.1	The student intake policy and admission criteria are defined, communicated, published, and up-to-date						x	
8.2	The methods and criteria for the selection of students are determined and evaluated						x	
8.3	There is an adequate monitoring system for student progress, academic performance, and workload						x	
8.4	Academic advice, co-curricular activities, student competition, and other student support services are available to improve learning and employability					x		

8.5	The physical, social and psychological environment is conducive for education and research as well as personal well-being					x		
	Overall opinion	**5.60**						
9	**Facilities and infrastructure**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
9.1	The teaching and learning facilities and equipment (lecture halls, classrooms, project rooms, etc.) are adequate and updated to support education and research						x	
9.2	The library and its resources are adequate and updated to support education and research					x		
9.3	The laboratories and equipment are adequate and updated to support education and research						x	
9.4	The IT facilities including e-learning infrastructure are adequate and updated to support education and research					x		
9.5	The standards for environment, health and safety; and access for people with special needs are defined and implemented					x		
	Overall opinion	**5.40**						
10	**Quality enhancement**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
10.1	Stakeholders' needs and feedback serve as input to curriculum design and development					x		
10.2	The curriculum design and development process is established and subjected to evaluation and enhancement				x			
10.3	The teaching and learning processes and student assessment are continuously reviewed and evaluated to ensure their relevance and alignment				x			
10.4	Research output is used to enhance teaching and learning				x			
10.5	Quality of support services and facilities (at the library, laboratory, IT facility and student services) is subjected to evaluation and enhancement				x			
10.6	The stakeholder's feedback mechanisms are systematic and subjected to evaluation and enhancement						x	
	Overall opinion	**5.33**						
11	**Output**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
11.1	The pass rates and dropout rates are established, monitored and benchmarked for improvement						x	
11.2	The average time to graduate is established, monitored and benchmarked for improvement						x	
11.3	Employability of graduates is established, monitored and benchmarked for improvement					x		
11.4	The types and quantity of research activities by students are established, monitored and benchmarked for improvement					x		
11.5	The satisfaction levels of stakeholders are established, monitored and benchmarked for improvement					x		
	Overall opinion	**5.40**						
	Overall verdict	**5.5**						

Supporting documents and evidences

No	Exh.	Title of Exhibition	Category
Criterion 1: Expected Learning Outcomes			
1	1.1	Feedback of stakeholders in 2011	
	1.1a	Survey reports on satisfaction level of stakeholders for ELOs and curriculum of MMT programme	Document
	1.1b	Meeting minute of the MMT Department on the ELOs and curriculum of MMT programme	Document
	1.1c	Meeting minute of the FME Academic and Scientific Committee on the ELOs and curriculum of MMT programme	Document
2	1.2	Benchmarking of MMT programme	
	1.2a	MMT programmes of some prominent national and foreign universities	Document
	1.2b	Analysing and benchmarking MMT programme of HCMUTE and the others	Document
3	1.3	Revision of ELOs of MMT programme	
	1.3a	Plan for revision of MMT programme in 2012, 2015	Document
	1.3b	Vision and Mission of HCMUTE and FME	Image
	1.3c	Survey reports on satisfaction level of stakeholders for the MMT programme in 2012, 2015	Document
	1.3d	Meeting minutes of the FME Academic and Scientific Committee on the ELOs and curriculum of MMT programme in 2012, 2015	Document
	1.3e	HCMUTE decision on the promulgation of MMT's ELOs in 2012	Document
4	1.4	Approaches to ELOs	
	1.4a	ELOs posted on FME website	Image
	1.4b	Meeting minutes of the FME on writing syllabi of MMT programme in 2012	Document
	1.4c	Syllabus of Introduction to Mechanical Engineering	Document
5	1.5	Feedback of stakeholders in 2015, 2016	
	1.5a	Survey reports on satisfaction level of stakeholders for ELOs and curriculum of MMT programme in 2015, 2016	Document
	1.5b	Feedback from Alumni and Industry in 2015, 2016	Document
	1.5c	Meeting minute of the MMT Department on the ELOs and curriculum of MMT programme in 2015, 2016	Document
	1.5d	Meeting minute of the FME Academic and Scientific Committee on the ELOs and curriculum of MMT programme in 2015, 2016	Document
6	1.6	Extracurricular activities	
	1.6a	Green Summer Volunteer Campaign	Document
	1.6b	Environmental Hygiene	Document
	1.6c	Field trip	Document
	1.6d	English club	Document
	1.6e	Soft skill club	Document
7	1.7	Revising the MMT programme	
	1.7a	MMT programme in 2008 and 2012	Document
	1.7b	Meeting minute of the MMT Department on the MMT programme	Document

	1.7c	Meeting minute of the FME Academic and Scientific Committee on the MMT programme	Document
8	1.8	MMT programmes in 2004, 2008 and 2012	
	1.8a	MMT programme in 2004	Document
	1.8b	MMT programme in 2008	Document
	1.8c	MMT programme in 2012	Document
9	1.9	Syllabus and portfolio of "Introduction to Mechanical Engineering"	
	1.9a	Syllabus of "Introduction to Mechanical Engineering"	Document
	1.9b	Portfolio of "Introduction to Mechanical Engineering"	Document
10	1.10	Assessment rubrics	
	1.10a	Rubric for course projects	Document
	1.10b	Rubric for capstone project	Document
	1.10c	Rubric for presentation	Document
	1.10d	Rubric for practical assessment	Document
11	1.11	Activities in capstone project	
	1.11a	Regulation on conducting capstone project	Document
	1.11b	List of capstone projects and Defence committees	Document
	1.11c	Images of Defence Day for Capstone project	Image
Criterion 2: Programme Specification			
12	2.1	Deployment of the programme specification	
	2.1a	MoET decision on opening new programme	Decision
	2.1b	HCMUTE decision on promulgation of MMT programme	Decision
	2.1c	List of teaching schedule and assigned lecturers for each semester	Document
	2.1d	Plan for orientation week	Document
	2.1e	MMT programme specification posted on FME website	Image
13	2.2	Some course syllabi	
	2.2a	Syllabus of Introduction to Mechanical Engineering	Document
	2.2b	Syllabus of Theory of Machine and Machine design	Document
	2.2c	Syllabus of Machine Manufacturing Technology	Document
	2.2d	Syllabus of Automation of Manufacturing Process	Document
14	2.3	Revising the course specification	
	2.3a	Syllabus of CAD/CAM-CNC Technology and Practice of CAD/CAM-CNC Technology	Document
	2.3b	Meeting minute of the MMT Department on the course specification	Document
	2.3c	Meeting minute of the FME Academic and Scientific Committee on the course specification	Document
15	2.4	Some course portfolios	
	2.4a	Portfolio of Introduction to Mechanical Engineering	Document
	2.4b	Portfolio of Tolerances and Measuring Techniques	Document
	2.4c	Portfolio of Fundamentals of Machine Manufacturing Technology	Document
Criterion 3: Programme Structure and Content			
16	3.1	Benchmarking of the MMT programme	
	3.1a	MMT programmes of some prominent national and foreign universities	Document

	3.1b	Analysing and benchmarking MMT programme of HCMUTE and the others	Document
17	3.2	Feedback of stakeholders in 2011	
	3.2a	Survey reports on satisfaction level of stakeholders for ELOs and curriculum of MMT programme	Document
	3.2b	Meeting minute of the MMT Department on the ELOs and curriculum of MMT programme	Document
	3.2c	Meeting minute of the FME Academic and Scientific Committee on the ELOs and curriculum of MMT programme	Document
18	3.3	Course syllabi	
	3.3a	Syllabus of Introduction to Mechanical Engineering	Document
	3.3b	Syllabus of Theory of Machine and Machine design	Document
	3.3c	Syllabus of Machine Manufacturing Technology	Document
	3.3d	Syllabus of Automation of Manufacturing Process	Document
19	3.4	MMT students' and lecturers' scientific projects	
	3.4a	MMT lecturers' scientific projects	Document
	3.4b	MMT students' scientific projects	Document
20	3.5	VJEC programme	
	3.5a	Function and Responsibility of VJEC	Document
	3.5b	Activities of VJEC	Document
21	3.6	MMT programmes in 2004, 2008 and 2012	
	3.6a	MMT programme in 2004	Document
	3.6b	MMT programme in 2008	Document
	3.6c	MMT programme in 2012	Document
22	3.7	Update on the MMT programme specification in 2015	
	3.7a	ISO procedure for revising academic programme	Document
	3.7b	Plan for revision of MMT programme specification in 2015	Document
	3.7c	Feedback from Alumni and Industry	Document
	3.7d	Meeting minutes of FME and MMT Department	Document
Criterion 4: Teaching and Learning Approach			
23	4.1	Activities to articulate FME educational philosophy	
	4.1a	Annual seminars on recommending and amending for curricula of the FME	Document
	4.1b	Minutes on dissemination of FME's educational philosophy	Document
24	4.2	Sample of course's portfolio	
	4.2a	Sample syllabi and course portfolios	Document
	4.2b	Minutes of final semester course meetings	Document
	4.2c	Samples of different formative and summative assessment methods	Document
	4.2d	Matrix of courses vs. expected learning outcomes	Document
25	4.3	Teaching provided by different departments for MMT programme	
	4.3a	HCMUTE regulation on innovation of teaching and learning methods	Document
	4.3b	Samples of syllabus using different teaching methods	Document
	4.3c	Seminars on teaching methods for engineering courses	Document

	4.3d	Papers attended the annual VEEC conferences by MMT lecturers	Document
26	4.4	Variety of active teaching methods	
	4.4a	Samples of syllabus using different teaching methods	Document
	4.4b	Seminars on teaching methods for engineering courses	Document
	4.4c	Papers attended the annual VEEC conferences by MMT lecturers	Document
	4.4d	Syllabus of "Introduction to Mechanical Engineering"	Document
27	4.5	Technology used in the instruction	
	4.5a	Courses' portfolios using computer simulation	Document
	4.5b	Digital Learning Center, policy and annual reports	Document
	4.5c	List of link of Online video lectures	Document
	4.5d	Laboratories with modern industrial facilities	Document
	4.5e	Training seminars for lecturers	Document
28	4.6	Supportive environment	
	4.6a	Library, open learning space and open Lab	Image
	4.6b	FME's supervising teams and services	Image
29	4.7	Practical trainings and community services	
	4.7a	Factory visiting plans, notices and reports	Document
	4.7b	Training for teachers of vocational schools provided by MMT Department	Document
	4.7c	Short training courses provided by the High Technology Center	Document
30	4.8	Research activities for students	
	4.8a	HCMUTE policy for students doing researches	Document
	4.8b	Research groups and research labs for students	Document
	4.8c	List of students' researches and their awards in the last 5 years	Document
	4.8d	Posters, papers, reports and pictures of students' researches output	Image
	4.8e	Annual FME's competitions	Image
	4.8f	National and international competitions (Koma-Taisen, ABU Robocon Contests, Yseali Food Innovation)	Image
31	4.9	Activities for exchange programme of the FME	
	4.9a	HCMUTE and FME policy to promote exchange programmes	Document
	4.9b	Exchange programmes with Korea, Taiwan, Thailand universities	Document
32	4.10	Activities for the management of the teaching and learning approach	
	4.10a	Course portfolios	Document
	4.10b	Teaching peer-review reports of MMT Department	Document
	4.10c	Statistic reports for courses evaluation of students from 2012-2017	Document
	4.10d	Department meeting on teachers' evaluation	Document
33	4.11	English competency	
	4.11a	English lectures of specialized courses	Document
	4.11b	FME's English Speaking club	Document
	4.11c	Capstone projects Defence committee in English	Document
34	4.12	IT competency	
	4.12a	Syllabus of "Introduction to Mechanical Engineering"	Document
	4.12b	Seminar of library on using their services	Document
	4.12c	Syllabi of programming courses	Document

35	4.13	Samples of course projects	
	4.13a	Samples of Project on Theory of machine and machine design	Document
	4.13b	Samples of Project on Machine Manufacturing technology	Document
36	4.14	Extracurricular activities and assessments	
	4.14a	Plans and Reports of extracurricular activities to teach ethics and social responsibilities for students	Document
	4.14b	Plans and final reports of Youth Union and Student Association	Document
	4.14c	Appendix 4: Matrix of extracurricular activities vs. expected learning outcomes	Document
	4.14d	Assessment of social responsibility for students	Document
	4.14e	Regulation for student grants	Document
37	4.15	The competence of initiative and entrepreneurship	
	4.15a	Report of student scientific research activities	Document
	4.15b	Plan and activities of the Faculty of Innovation and Entrepreneurship	Document
	4.15c	Organizing plan for the Week of civil information supplementation	Document
Criterion 5: Student Assessment			
38	5.1	New student admission assessment	
	5.1a	Student Enrolment Project	Document
	5.1b	Decision on Entrance English	
	5.1c	Regulation on Entrance English placement tests	
	5.1d	Entrance English placement tests notice	Document
	5.1e	Results of Entrance English placement	Document
39	5.2	Tools that ensure for the alignment of continuous assessment and ELOs	
	5.2a	Appendix 2: Matrix of courses vs. expected learning outcomes	Document
	5.2b	Samples of courses' syllabi with assessment schedule, content and methods	Document
40	5.3	Different forms of assessment	
	5.3a	Samples of diagnostic tests	Document
	5.3b	Assessment samples using desktop project, presentation, and report	Document
	5.3c	Sample rubrics for assessment of presentation	Document
	5.3d	Samples of test sheets	Document
41	5.4	Regulation and implementation of internship and capstone project	
	5.4a	Sample internships and rubric for evaluation	Document
	5.4b	Regulations on Capstone Projects	Document
	5.4c	List of capstone projects and Defence committees	Document
	5.4d	Posters, summary papers and thesis of capstone projects (template and samples)	Document
	5.4e	Rubrics for capstone projects evaluation (for advisor, reviewer, and committee)	Document
42	5.5	Extracurricular activities and assessments	
	5.5a	Extracurricular activities to teach ethics and social responsibilities for students	Document
	5.5b	Plans and final reports of Youth Union and Student Association	Document

	5.5c	Appendix 4: Matrix of extracurricular activities vs. expected learning outcomes	Document
	5.5d	Assessment of social responsibility for students	Document
	5.5e	Regulation for student grants	Document
43	5.6	Grading benchmark	
	5.6a	Regulations of university and college in credits system	Document
	5.6b	Grading sheets and sample of students' work	Document
44	5.7	Publicity of the assessment/examination regulations	
	5.7a	Samples of courses' rubrics	Document
	5.7b	Online surveys for students and school's reports to evaluate the teaching quality (theory and practice courses)	Document
45	5.8	The assessment and evaluation processes are communicated to students	
	5.8a	Course introduction video clips	Document
	5.8b	Weekly feedback for students' assignment, course projects	Document
	5.8c	Answers for the final test and grading scheme	Document
46	5.9	Quality assurance for assessment tools	
	5.9a	Rubrics for the evaluation of course projects and presentation	Document
	5.9b	Minutes of course teams at the end of semesters	Document
47	5.10	Procedures for composing, delivering and monitoring the test and grade	
	5.10a	ISO procedures for composing, delivering and monitoring the test and grade	Document
	5.10b	FME link of answers for the test questions	Website
48	5.11	ISO Monitoring final examination and appeal procedure	
	5.11a	ISO Monitoring final examination procedure	Document
	5.11b	HCMUTE Procedure on grading and re-grading	Document
49	5.12	Assessment of students' social responsibility	Document
50	5.13	Regulations on teaching assistants	Document
51	5.14	Timely feedback of student assessment	
	5.14a	FME regulation on preparing exam questions and answers	Document
	5.14b	FME link of answers for final tests	Document
52	5.15	Feedback of experimental courses and course projects	
	5.15a	Samples of experimental reports	Document
	5.15b	Samples of weekly project feedback	Document
53	5.16	Student complaint resolution procedure	Document
Criterion 6: Academic Staff Quality			
54	6.1	Academic staff planning	
	6.1a	HCMUTE and FME human resource planning	Document
	6.1b	FME development strategy	Document
	6.1c	List of FME staff	Document
	6.1d	List of visiting lecturers of FME	Document
	6.1e	Lecturers' title accreditation	Document
55	6.2	Human resource policy related to academic staff	
	6.2a	Professor title registration announcement	Document
	6.2b	Retirement regulations	Document
	6.2c	Education Law execution	Document

	6.2d	Retirement announced on the homepage	Document
	6.2e	Insurance policies	Document
	6.2f	Promotion and designation regulations	Document
	6.2g	Job description for FME academic staff	Document
56	6.3	Teaching activity monitoring	
	6.3a	A course outline	Document
	6.3b	Teaching schedule of MMT Department	Document
	6.3c	Tutor policies for academic staff	Document
	6.3d	Teaching profile of a course	Document
	6.3e	Teaching learning activity report	Document
	6.3f	Final test content matching with the course syllabi	Document
	6.3g	Variety of instructional media used to consult students	Document
	6.3h	Teaching observation plan	Document
	6.3i	Teaching observation report	Document
57	6.4	HCMUTE financial planning and execution	
	6.4a	HCMUTE internal expenses	Document
	6.4b	HCMUTE financial revenue and expenditure report	Document
58	6.5	Assessment of academic staff performance	
	6.5a	KPIs system	Document
	6.5b	Lecturer's satisfaction surveys	Document
	6.5c	Student surveys on service satisfaction	Document
	6.5d	Quality assurance report on teaching activities	Document
	6.5e	Self-assessment report	Document
	6.5f	Personal planning report	Document
	6.5g	Supervision of HCMUTE education inspectors to teaching activities	Document
59	6.6	Academic staff recruitment	
	6.6a	Standards for lecturers	Document
	6.6b	HCMUTE recruitment statistics	Document
	6.6c	FME recruitment proposal	Document
	6.6d	Recruitment announcement on the homepage	Document
	6.6e	Academic staff recruitment process	Document
	6.6f	Criteria checklist for academic staff candidates	Document
	6.6g	Probation guides for academic staff	Document
	6.6h	Probation ending documents of academic staff	Document
	6.6i	HCMUTE adjusted standards for lecturers	Document
	6.6g	HCMUTE recruitment proposal	Document
	6.6k	Decision for probation officers	Document
	6.6l	The required eligibility for academic staff to end the probation period	Document
60	6.7	Training activities for FME academic staff	
	6.7a	Lecturer fostering announcement	Decision
	6.7b	List of training courses for academic staff	Document
	6.7c	Announcement for performance report submission	Document

	6.7d	Training course announcement	Document
	6.7e	English test results of academic staff	Document
	6.7f	Professor title application	Document
	6.7g	FME training course proposal	Document
	6.7h	HR training and development process	Document
61	6.8	Revising the MMT programme	
	6.8a	MMT programme in 2008 and 2012	Document
	6.8b	Meeting minute of the MMT Department on the MMT programme	Document
	6.8c	Meeting minute of the FME Academic and Scientific Committee on the MMT programme	Document
62	6.9	Research activities and related support policies	
	6.9a	Research project implementation procedure	Document
	6.9b	Regulation for scientific research norm of teachers	Document
	6.9c	Budget distribution plan for scientific projects	Document
	6.9d	Regulation for Financial support for scientific papers published on international journals	Document
	6.9e	Decision on Featured research teams	Document
	6.9f	List of research projects of teachers	Document
Criterion 7: Support Staff Quality			
63	7.1	Support staff planning	
	7.1a	HCMUTE HR planning	Document
	7.1b	FME strategic plan	Document
64	7.2	FME strategic plan	Document
65	7.3	HCMUTE HR report	Document
66	7.4	Decision on Department and Center functions	Decision
67	7.5	Library HR planning	Document
68	7.6	Survey report from HCMUTE student affairs office	Document
69	7.7	Annual equipment replacement/supplement budget plan	Document
70	7.8	Annual student survey results regarding to subjects	Document
71	7.9	HCMUTE HR policies related to support staff	
	7.9a	Retirement regulations for support staff	Decision
	7.9b	Education Law execution	Decision
	7.9c	Retirement announced on the homepage	Document
	7.9d	Insurance policies for support staff	Decision
	7.9e	Promotion and designation regulations	Decision
72	7.10	Decision on IT center functions	Decision
73	7.11	Service activities of support staff	
	7.11a	Library services announced on the homepage	Document
	7.11b	Student survey for the library's service improvement	Document
	7.11c	Support staff attending Open Day festival	Document
	7.11d	Student consultant activities of support staff	Document
	7.11e	Job hunting activities of support staff	Document
	7.11f	List of students supported by Student Services Center at school year of 2013-2014	Document

	7.11g	List of staff support borrowing rooms for student service activities	Document
	7.11h	List of students applying part time jobs introduced by the support staff	Document
74	7.12	Support staff recruitment, emulation and rewards for support staff	
	7.12a	HCMUTE recruitment statistics	Document
	7.12b	Recruitment announced on the homepage	Document
	7.12c	Support staff recruitment process	Document
	7.12d	Criteria checklist for a support staff candidate	Document
	7.12e	HCMUTE recruitment proposal	Document
	7.12f	Proposal submitted by subunits of HCMUTE for recruitment of support staff	Document
	7.12g	Emulation guides for support staff	Decision
	7.12h	Emulation titles for support staff	Document
	7.12i	Salary increase decision for support staff	Decision
	7.12j	Salary increase announcement for support staff	Decision
75	7.13	Training activities for support staff	
	7.13a	Training-fostering plans for support staff	Decision
	7.13b	List of training courses for support staff	Document
	7.13c	Announcement for performance report submission	Decision
	7.13d	Training course announcement for support staff	Decision
	7.13e	English test results for support staff	Document
	7.13f	HR training and development process	Document
Criterion 8: Student quality and support			
76	8.1	Student admission	
	8.1a	MoET statute for student admission for universities and colleges	Document
	8.1b	Admission announcement for university, college and vocational high school levels	Document
	8.1c	Admission website [http://tuyensinh.hcmute.edu.vn/]	Link
	8.1d	Decision on awarding scholarship for excellent results	Decision
	8.1e	Decision on waiving tuition fee for MMT female students	Decision
	8.1f	Decision on tuition fee exemption for MMT students in the educational programme	Decision
	8.1g	Announcement for award holding students recruitment	Document
	8.1h	Decision on scholarship award for student motivation	Document
	8.1i	Decision on cut-off entrance score for D1-, A- and A1-categories	Decision
77	8.2	Plans for Open-days and related images	Document
78	8.3	Decision of English proficiency qualification and grading transfer for English credit	Decision
79	8.4	MMT programme's cut-off scores	Document
80	8.5	Statistics of the number of students from 2006 to 2016	Document
81	8.6	Course registration	Document
	8.6a	Announcement of plan and statute for course registration	Document
	8.6b	Instruction for online course registration	Document
82	8.7	Credit-based higher education system implementation	
	8.7a	Decision on issuing Statutes for Credit-based higher education	Decision

		system	
	8.7b	Implementation instruction for Credit-based higher education system	Document
	8.7c	Statutes for curricula constructing and course distribution in the 150-credit study programme	Document
	8.7d	Decision on issuing Higher education programme	Decision
	8.7e	Plan of study for MMT programme	Document
83	8.8	Student support service	
	8.8a	Student Service Center	Document
	8.8b	Student handbook	Book
84	8.9	Early-programme orientation	
	8.9a	Plan for orientation week	Document
	8.9b	Report of orientation week	Document
	8.9c	Orientation activities	Document
85	8.10	Student consultation	
	8.10a	Statute for consultation to students	Document
	8.10b	Decision on consultant selection	Decision
86	8.11	Decision for opening supplementary English classes	Decision
87	8.12	Report of Talks between University/FME administrators and students	
	8.12a	Plan for Talks between University/FME administrators and students	Document
	8.12b	Summary of students' feedback in Talks between University/FME managers and students	Document
	8.12c	Conclusions and new tasks from University president	Document
	8.12d	Report of fulfilment results of assigned tasks from the University President	Document
	8.12e	Report of Talks between FME administrators and students	Document
88	8.13	Time schedule for lecturers' duty time at the MMT department office	Document
89	8.14	Student research projects and awards	Document
90	8.15	Students’ extracurricular activities and competitions	Document & photo
91	8.16	Student health care service	
	8.16a	Health test for new students and other activities	Document
	8.16b	Student health insurance payment	Document
Criterion 9: Facilities and infrastructure			
92	9.1	HCMUTE Campus Information	
	9.1a	HCMUTE map in 2030	Image
	9.1b	Construction area	Document
	9.1c	Four construction works and construction plan for F1 building	Image
93	9.2	Plan of updating the facilities and equipment	
	9.2a	FME plan for buying new equipment	Document
	9.2b	FME plan for repair and maintenance of offices, workshops and LABs	Document
94	9.3	FME’s strategic plans	Document
95	9.4	HCMUTE’s library resources	

	9.4a	Regulation of library and website	Document
	9.4b	List of mechanical engineering books	Document
	9.4c	Announcement of compiling books	Document
	9.4d	FME's library	Document
96	9.5	HCMUTE's library e-resources	
	9.5a	Sample of e-databases	Image
	9.5b	Link e- library	Image
	9.5c	List of electronic textbooks	Document
97	9.6	Announcement of new books, book exchange and book fair	
	9.6a	Announcement of new books	Document
	9.6b	Exchange new books for old books	Image
	9.6c	Book fair	Image
98	9.7	Library infrastructure	
	9.7a	Library facilities	Image
	9.7b	Interaction of library and readers	Image
	9.7c	Wi-Fi system for the library	Document
99	9.8	IT facilities	
	9.8a	Update IT system	Document
	9.8b	PSC software	Image
	9.8c	FME's website	Image
	9.8d	Information of marks, schedules, classrooms	Image
	9.8e	Register subject online	Image
	9.8f	Online learning	Image
100	9.9	Digital Learning Center	
	9.9a	Digital Learning Center facilities	Image
	9.9b	Number of e-learning course	Document
	9.9c	Moodle system	Image
101	9.10	Application of IoT in education and management	Document
102	9.11	Regulation, pre-test, emergency protocol	
	9.11a	Laboratory and Workshop regulations	Document
	9.11b	Sample of pre-test on environment, health and safety	Document
	9.11c	Emergency protocol	Image
103	9.12	Health care	
	9.12a	Health insurance and accident insurance for the university staff and students	Document
	9.12b	Inspection of food sanitation	Document
	9.12c	Spraying insecticides	Document
	9.12d	Periodic examination	Document
Criterion 10: Quality enhancement			
104	10.1	Inputs & feedback of stakeholders for the curriculum development	
	10.1a	Comparison between MMT programmes applied in 2008 and in 2012	Document
	10.1b	Reports of annual meetings and workshops with employers and alumni	Document
	10.1c	Meeting reports of the FME Academic and Scientific Committee	Document

		on revising the MMT programme	
	10.1d	Surveys of students on teaching quality of lecturers	Document
	10.1e	Meeting minutes between students and Dean Board, students and Presidential Board	Document
	10.1f	Survey results of newly graduated students	Document
105	10.2	UTE's ISO procedures for stakeholders' evaluation	
	10.2a	ISO procedure for evaluating the satisfaction of stakeholders on the training curriculums	Document
	10.2b	ISO procedure for evaluating the satisfaction of students during their training	Document
106	10.3	ISO procedures for the curriculum design and development	
	10.3a	UTE's ISO procedure for the curriculum design and development version 2015	Document
	10.3b	Statute No. 125/QC-ĐHSPKT-ĐT date 22/12/2008 (Student Handbook 2015 – page 11)	Document
107	10.4	International networks that the department participates	
	10.4a	Curriculum benchmark	Document
	10.4b	MMT lecturers attended seminars, workshops, trainings of HEEAP, BUILD-IT, VULLI, COMET	Document
	10.4c	Assessment amelioration seminar from Fulbright professors	Document
	10.4d	Exchange programmes with Korea, Taiwan, Thailand universities	Document
108	10.5	Curriculum evaluation and improvement	
	10.5a	Comparison between MMT programmes applied in 2008 and in 2012	Document
	10.5b	Evaluation report for the curriculum implementation (Dec 2015)	Document
109	10.6	Review and evaluation of teaching quality	
	10.6a	Plan and reports of teaching visits from department board	Document
	10.6b	Student online feedback forms and reports for courses	Document
	10.6c	Action reports for teaching enhancement from MMT Department	Document
110	10.7	Improvement in the teaching, learning and assessment activities	
	10.7a	ELOs focuses on soft skills	Document
	10.7b	Online LMS course list and English or bilingual course list	Document
	10.7c	Rubrics for the evaluation of course projects and presentation in the course portfolios	Document
111	10.8	Research outputs of teachers support teaching	
	10.8a	Lecturers' KPIs system	Document
	10.8b	Annual research topics lists of FME teachers	Document
	10.8c	Samples of MMT lecturers researches	Document
	10.8d	The MMT lecturers' engineering and technology publications	Document
	10.8e	The MMT lecturers' papers attended engineering educational conferences (VEEC, STEMCON, and IETEC)	Document
112	10.9	Students' research outputs	
	10.9a	Student research guide and procedure	Document
	10.9b	Annual research topics lists of FME students	Document
	10.9c	Sample researches of MMT students (2013-2017)	Document
	10.9d	MMT students awards of national and international competitions	Document

		(Koma-Taisen, Robocon 2017)	
113	10.10	Support services and facilities evaluation and enhancement	
	10.10a	The library's enhancement	Document
	10.10b	Equipment and facilities usage procedures	Document
	10.10c	Equipment and facilities usage forms	Document
	10.10d	Student services evaluation and enhancement	Document
114	10.11	Systematic feedback mechanisms for stakeholders	
	10.11a	Curriculum evaluation feedback in 2015 i. FME curriculum revision workshop plan ii. FME curriculums workshop presentation iii. Survey form for employer on MMT curriculum iv. Meeting minute of revising ELOs and curriculum of MMT programme v. Meeting minute of FME Academic Science Committee on revising the ELOs and curriculum of MMT programme vi. Survey reports on satisfaction level of stakeholders for ELOs and curriculum of MMT programme	Document
	10.11b	MMT graduated students survey reports	Document
	10.11c	Curriculum evaluation feedback in 2016 i. CDIO curriculum implementation evaluation HCMUTE plan ii. Decision of advisory board for curriculum evaluation iii. HCMUTE curriculum implementation evaluation workshop plan iv. FME curriculum implementation evaluation workshop plan v. FME curriculum implementation workshop schedule vi. CDIO curriculum implementation Workshop presentation vii. Survey form for employer on FME curriculum viii. Comments from alumni for MMT programme ix. Curriculum workshop minutes x. Curriculum evaluation Report	Document
Criterion 11: Output			
115	11.1	Dashboard system for managing student activities	Image
116	11.2	FME training plan and report	
	11.2a	Quality targets of FME's annual training plan	Document
	11.2b	Report of FME's annual training plan performance	Document
117	11.3	Training system	
	11.3a	Decision No. 43/2007/QD-BGDDT about Regulation for credit-based training system in the universities and colleges	Decision
	11.3b	Students' Handbook	Document
118	11.4	Accounts and online reference	
	11.4a	Instruction of use for student accounts and online reference	Document
	11.4b	Instruction of use for lecturer accounts and online reference	Document
119	11.5	Pass rates and dropout rates of FME students	Document
120	11.6	Solutions for enhancing pass rate	
	11.6a	Regulation for student consulting responsibility	Document
	11.6b	Decision No. 389/QD-DHSPKT-CTHSSV in regards to the regulations on consultancy for students	Decision

	11.6c	Decisions about foundation of the consultants	Decision
	11.6d	Procedure for registration of retrain for failed students or leaving school for dropout students	Document
	11.6e	List of warned students	Document
	11.6f	Minute of meeting between Board of Dean and faculty staff	Document
	11.6g	Minute of meeting between lecturers and students in 2015 and 2016	Document
	11.6h	Activity plan of Skill and English Club	Document
121	11.7	Regulation on HCMUTE's education programme	Document
122	11.8	MMT curriculum	Document
123	11.9	Average study duration	
	11.9a	Summary of average study duration	
	11.9b	Consolidated list of ahead-of-schedule graduates in the last 3 years	
124	11.10	Education Law 2012, Article 35	Decision
125	11.11	Solutions for improving rate of graduation	
	11.11a	Workshop for improving the quality of FME training programmes in 2015	Document
	11.11b	Learning plan in each semester	Document
	11.11c	Course online registration guide	Document
	11.11d	Announcement for course online registration and amendment	Document
	11.11e	Plan for summer (3rd) semester	Document
	11.11f	FME's undergraduate level training program	Document
	11.11g	Regulation for scholarships for high score students	Document
126	11.12	Results of online surveys	
	11.12a	Survey form for 3 month-graduated and 6 month-graduated students	Document
	11.12b	Survey results of graduated students from 2011 to 2013	Document
	11.12c	Survey results of graduated students from 2014 to 2016	Document
127	11.13	Job Fair Day	
	11.13a	Announcement for Job Fair Day	Document
	11.13b	Organization plan for Job Fair Day	Document
	11.13c	List of industrial participants on Job Fair Day	Document
	11.13d	Images of Job Fair Day	Image
128	11.14	SAR of Faculties	
	11.14a	SAR of Faculty of Vehicle and Energy Engineering (FVEE)	Document
	11.14b	SAR of Faculty of Civil Engineering (FCE)	Document
	11.14c	SAR of Faculty of Electrical and Electronics Engineering (FEEE)	Document
	11.14d	SAR of Faculty of Mechanical Engineering (FME)	Document
129	11.15	Research projects of teachers and students	
	11.15a	Guideline for students in doing research	Document
	11.15b	List of research projects of teachers and students	Document
	11.15c	List of FME students achieving scientific research awards	Document
130	11.16	Student feedback	
	11.16a	Survey form for student feedback on teaching activities	Document

	11.16b	Results on student's feedback on teaching activities in 2015 and 2016	Document
	11.16c	Announcement on organizing the training course about pedagogic major	Document
131	11.17	KPIs system	
	11.17a	Decision on the promulgation of the implementing KPIs system	Decision
	11.17b	Guide to use KPIs performance appraisal system	Document
132	11.18	Graduates feedback	
	11.18a	Survey form for FME graduates	Document
	11.18b	Results on graduates' feedback on training programme	Document
133	11.19	The Decree of promulgating the general programme of revolutionizing State administration, 30c/NQ-CP	Document
134	11.20	Stakeholders feedback	
	11.20a	Annual conference of the university's staffs and lecturers	Document
	11.20b	Survey form for the satisfaction level of industry to graduated students	Document
	11.20c	Results on the satisfaction level of outside companies to graduated students	Document
135	11.21	Continuous improvement based on stakeholders feedback	
	11.21a	E/M learning application	Document
	11.21b	Regulation on teaching assistance	Document
	11.21c	Policy for promotion and salary raise for lecturers	Document
	11.21d	Policy for lecturer research	Document
	11.21e	Annual rewards for staff and students	Document

PART 4: APPENDICES

Appendix 1: List of Laboratories and Research Groups

Laboratories and Workshops for learning and practicing			
No	**Laboratory / Workshop title**	**Room**	**Director**
1	CNC Milling Lab	E1-307	Nguyễn Văn Sơn, MSc.
2	CNC Turning Lab	E1-305	Huỳnh Đỗ Song Toàn, MSc.
3	3D Scanning Lab	E1-306	Nguyễn Trọng Hiếu, MSc.
4	Computer Base Training System Lab	E1-303	Nguyễn Văn Sơn, MSc.
5	Smart CMM Machine Lab	E1-304	Trần Minh Thế Uyên, MSc.
6	Rapid Prototype Machine	E1-308	Trần Văn Trọn, MSc.
7	Automation Simulation Lab	Section E	Dr. Vũ Quang Huy
8	Manufacturing Process Automation Lab	Section E	Đinh Nhật Huy, MSc.
9	Process Control & Industrial Communication Networks Lab	E1-311	Nguyễn Xuân Quang, MSc.
10	Industrial Robots Lab	02CNC1	Assoc. Prof. Dr. Nguyễn Trường Thịnh
11	Digital Techniques & Microcontroller Lab	02CNC1	Bùi Hà Đức, Dr.
12	Electrical & Electronics Engineering Lab	Section E	Trần Thụy Uyên Phương, MSc.
13	Advanced Control Lab	Section E	Vũ Quang Huy, Dr.
14	Electric Drives Lab	02ĐLCK	Dương Thế Phong, MSc.
15	Pneumatics - Hydraulics Lab	02BTBD	Tuong Phuoc Tho, MSc.
16	Machine Design Lab	TNVL	Nguyễn Văn Đoàn, MSc.
17	Engineering Materials Lab	02TKM	Nguyễn Văn Thức, MSc.
18	Metal Technology Lab	Section E	Nguyễn Thanh Tân, MSc.
19	Arc Welding Lab	Section E	Nguyễn Văn Hướng, BSc.
20	Gas Welding Lab	Section E	Nguyễn Văn Hướng, BSc.
21	Electrical Equipment Lab	Section E	Trần Thanh Lam, MSc.
22	Industrial Maintenance Lab	Section E	Trần Thái Sơn, MSc.
23	Mechanical Measuring Lab	Section E	Đặng Minh Phụng, MSc.
24	Plastic Technology Practice	Section E	Trần Minh Thế Uyên, MSc.
25	CAD/CAM-CNC Lab	Section E	Dương Thị Vân Anh, MSc.
26	Electrical Discharge Machining Lab	Section E	Nguyễn Văn Minh, MSc.
27	CNC Lab	Section E	Trần Chí Thiên, MSc.

Distinctive Research Groups			
No	**Laboratory title**	**Room**	**Group leader**
1	Mechanics of Energy and Industrial Equipment	A1-121	Assoc. Prof. Dr. Le Hieu Giang
2	Industrial Automation	Section F	Assoc. Prof. Dr. Nguyễn Trường Thịnh
3	Mechanical and Environmental Engineering	Section E	Assoc. Prof. Dr. Đang Thien Ngon
Research Laboratories			
No	**Laboratory title**	**Room**	**Director**
1	Open Lab	Section F	Assoc. Prof. Dr. Nguyễn Trường Thịnh
2	Young Scientist Club	Section F	Lê Tấn Cường, MSc.
3	Applied Mechatronics	Section E	Cái Việt Anh Dũng, Dr.
4	MET Research and Application Lab	Section E	Dương Thế Phong, MSc.
5	Automatic and Intelligent Control Lab	Section E	Vũ Quang Huy, Dr.
6	Creativity, Environment and Service Lab	Section E	Trần Ngọc Đảm, Dr.
7	Power Electronics and New Energy Lab	Section E	Nguyễn Minh Khai, Dr.
8	Laboratory for Designing, Simulating, Manufacturing and Transferring Mechanical Engineering Equipment	Section E	Pham Huy Tuan, Dr.

Appendix 2: ***Matrix of courses vs. Expected learning outcomes of Machine Manufacturing Technology programme***

Expertise 1: Major in Machine Manufacturing Technology

No	Code	Course	Credits	Semester	ELOs/Contribution level												
					ELO 01	ELO 02	ELO 03	ELO 04	ELO 05	ELO 06	ELO 07	ELO 08	ELO 09	ELO 10	ELO 11	ELO 12	ELO 13
1	MATH130101	Advanced Mathematics A1	3	1	P	N	N	N	N	N	N	P	N	N	N	N	N
2	ENGL130137	English 1	3	1	P	N	N	N	N	N	P	P	N	N	N	N	N
3	GCHE130103	General Chemistry A1	3	1	P	N	N	N	N	N	N	P	N	N	N	N	N
4	INME130125	Introduction to Mechanical Engineering	3	1	N	P	N	N	P	P	P	P	P	P	N	N	N
5	VBPR131085	Visual Basic Programming	3	1	N	P	N	N	P	N	N	P	N	N	N	N	N
6	MATH130201	Advanced Mathematics A2	3	1	S	N	N	N	N	N	N	S	N	N	N	N	N
7	GELA220405	General Law	2	1	N	N	N	N	N	N	N	P	P	N	N	N	N
8	PHED110513	Physical Education 1	1	1	N	N	N	N	P	N	N	P	N	N	N	N	N
9	MATH130301	Advanced Mathematics A3	3	2	H	N	N	N	N	N	N	H	N	N	N	N	N
10	MATH130401	Applied Probability & Statistics	3	2	H	N	N	N	N	N	N	H	N	N	N	N	N
11	LLCT150105	Basic principles of Marxism & Leninism	5	2	N	N	N	N	N	N	N	S	S	N	N	N	N
12	ENGL230237	English 2	3	2	S	N	N	N	N	N	S	S	N	N	N	N	N
13	PHYS130102	Fundamental Physics A1	3	2	S	N	N	N	N	N	N	S	N	N	N	N	N
14	PHED110613	Physical Education 2	1	2	N	N	N	N	S	N	N	S	N	N	N	N	N
	Choose three from the following elective General knowledge courses		6	2													
	GEEC220105	General Economics	2		N	N	N	N	S	S	N	S	N	N	N	N	N
	INMA220305	Introduction of Management	2		N	N	N	N	S	S	N	S	N	N	N	N	N
	INLO220405	Introduction to Logics	2		N	N	N	N	S	S	N	S	N	N	N	N	N
	ULTE121105	Learning Methods in University	2		N	N	N	N	S	S	N	S	N	N	N	N	N

No	Code	Course	Credits	Semester	ELOs/Contribution level												
					ELO 01	ELO 02	ELO 03	ELO 04	ELO 05	ELO 06	ELO 07	ELO 08	ELO 09	ELO 10	ELO 11	ELO 12	ELO 13
	SYTH220505	Systematic Thinking	2		N	N	N	N	S	S	N	S	N	N	N	N	N
	PLSK320605	Planning Skills	2		N	N	N	N	S	S	N	S	N	N	N	N	N
	IVNC320905	Introduction to Vietnamese Culture	2		N	N	N	N	S	S	N	S	N	N	N	N	N
	INSO321005	Introduction to Sociology	2		N	N	N	N	S	S	N	S	N	N	N	N	N
15	LLCT120314	Ho Chi Minh's Ideology	2	3	N	N	N	N	N	N	N	S	S	N	N	N	N
16	ENGL330337	English 3	3	3	H	N	N	N	N	N	H	H	N	N	N	N	N
17	PHYS120202	Fundamental Physics A2	2	3	H	N	N	N	N	N	N	H	N	N	N	N	N
18	PHYS110302	Experiment of Physics	1	3	H	N	N	N	N	N	N	H	N	N	N	N	N
19	THME230721	Theory of Mechanics	3	3	N	P	P	N	S	S	S	N	N	N	N	N	N
20	EDDG230120	Descriptive Geometry and Technical Drawing	3	3	N	P	P	N	S	S	S	N	N	N	N	N	N
21	ENMA220126	Materials Science	2	3	N	P	P	N	S	S	S	N	N	N	N	N	N
22	MHAP120227	Mechanical Works Practice	2	3	N	P	P	P	S	S	S	N	S	N	N	N	N
23	PHED130715	Physical Education 3 (Elective)	3	3	N	N	N	N	S	N	N	S	N	N	N	N	N
24	LLCT230214	Vietnamese Communist Party's revolutionary policies	3	4	N	N	N	N	N	N	N	S	S	N	N	N	N
25	TOMT220225	Tolerances and Measuring Techniques	2	4	N	S	S	N	S	P	P	S	N	N	N	N	N
26	TMMP230220	Theory of Machine and Machine design	3	4	N	S	S	N	S	S	S	N	N	N	P	N	N
27	STMA230521	Strength of Materials	3	4	N	S	S	N	S	S	S	S	N	N	N	N	N
28	EXMM210325	Experiment of Mechanical Measurement	1	4	N	P	S	P	S	N	P	N	P	N	N	N	N
29	MATE211126	Experiment on Materials Science	1	4	N	P	S	P	S	N	P	N	P	N	N	N	N
30	PEPR220426	Welding Practice	2	4	N	P	S	P	S	N	P	N	P	N	N	N	N

No	Code	Course	Credits	Semester	ELOs/Contribution level												
					ELO 01	ELO 02	ELO 03	ELO 04	ELO 05	ELO 06	ELO 07	ELO 08	ELO 09	ELO 10	ELO 11	ELO 12	ELO 13
31	MATH131501	Applied Mathematics in Engineering	3	4	H	S	N	N	N	N	N	H	N	N	N	N	N
	Choose one from the following elective fundamental courses		3	4													
	CADM230320	Computer-Aided Design	3		N	S	S	N	S	S	S	N	N	N	N	N	N
	EEEN230129	Electrical and Electronic Engineering	3		N	S	S	N	S	S	S	N	N	N	N	N	N
32	METE330126	Metal Technology	3	5	N	S	S	N	S	S	S	S	N	P	P	N	N
33	METE210321	Experiment of Mechanics	1	5	N	S	S	S	N	N	N	N	N	N	N	N	N
34	PMMD310423	Project on Theory of machine and machine design	1	5	N	S	S	N	S	S	S	N	N	N	P	N	N
35	FMMT330825	Fundamentals of Machine Manufacturing Technology	3	5	N	H	H	N	S	S	S	S	N	P	P	N	N
36	BATP230227	Basic Turning Practice	3	5	N	S	S	S	S	S	N	N	N	P	P	P	N
37	BAMP220327	Basic Milling Practice	2	5	N	S	S	S	S	S	N	N	N	P	P	P	N
	Choose three from the following elective fundamental courses		6	5													
	ENVI320921	Engineering Vibrations	2		N	S	S	N	S	S	S	S	N	N	N	N	N
	FLUI220132	Fluid Mechanics	2		N	S	S	N	S	S	S	S	N	N	N	N	N
	THER222932	Thermal Engineering	2		N	S	S	N	S	S	S	S	N	N	N	N	N
	OPTE322925	Optimization in Engineering	2		N	S	S	N	S	S	S	S	N	N	N	N	N
38	MTNC340925	Machines and Numerical Control Systems	4	6	N	H	H	S	S	S	S	S	N	S	S	N	P
39	MMAT431525	Machine Manufacturing Technology	3	6	N	H	H	N	H	H	S	S	N	S	S	N	P
40	PNHY330529	Pneumatic –Hydraulic Technology	3	6	N	H	H	N	H	H	S	S	N	S	S	N	P

No	Code	Course	Credits	Semester	ELOs/Contribution level												
					ELO 01	ELO 02	ELO 03	ELO 04	ELO 05	ELO 06	ELO 07	ELO 08	ELO 09	ELO 10	ELO 11	ELO 12	ELO 13
41	EPHT310629	Experiments of Pneumatic – Hydraulic Technology	1	6	N	H	H	S	H	H	N	N	P	S	S	N	P
42	ENME320124	English for Mechanical Engineering	2	6	N	S	S	N	S	S	H	S	P	N	N	N	N
43	TPRA340527	Advanced Turning Practice	4	6	N	S	S	S	N	N	N	N	N	N	S	N	N
44	EEEI321925	Electrical and Electronic Equipment in Industrial machines	2	6	N	S	S	N	S	S	S	S	N	S	S	N	P
45	ELDR312025	Experiments on Electrical and Electronic Equipment in Industrial machines	1	6	N	S	S	S	S	S	S	S	S	S	P	P	S
46	CCCT431725	CAD/CAM-CNC Technology	3	7	N	S	S	N	S	S	S	S	N	N	S	S	N
47	PCCC421825	Practice of CAD/CAM-CNC Technology	2	7	N	S	S	H	S	S	S	S	S	S	S	S	S
48	PMMT411625	Project on Machine Manufacturing Technology	1	7	N	H	H	H	H	H	N	H	N	H	H	N	N
49	MPRA320927	Advanced Mechanical Practice	2	7	N	H	H	H	N	N	N	N	N	N	H	N	N
50	AUMP323525	Automation of Manufacturing Process	2	7	N	H	H	N	H	H	H	N	N	H	H	N	H
51	EMPA313625	Experiments on Automation of Manufacturing Process	1	7	N	H	H	H	H	N	N	N	N	N	H	H	H
	Choose three from the following elective Specialized Courses		6	7													
	MQMA321125	Manufacturing and Quality Management	2		N	S	S	N	H	H	H	S	S	N	N	S	N
	IMAS320525	Maintenance in Industry	2		N	S	S	N	H	H	H	S	S	H	H	H	N
	EIMA310625	Experiments on Maintenance in Industry	1		N	S	S	H	H	H	H	S	S	H	H	H	N

No	Code	Course	Credits	Semester	ELOs/Contribution level												
					ELO 01	ELO 02	ELO 03	ELO 04	ELO 05	ELO 06	ELO 07	ELO 08	ELO 09	ELO 10	ELO 11	ELO 12	ELO 13
	MOLD431224	Mould Design and Fabrication	3		N	S	S	N	H	H	H	S	N	N	N	N	N
	DEIP331225	Industrial Product Design	3		N	S	S	N	H	H	H	S	N	S	S	N	N
	ERMA321025	Energy and Energy Management	2		N	S	S	N	H	H	H	S	N	S	S	N	N
	NTMP320725	Non-traditional Manufacturing Methods	2		N	S	S	N	H	H	H	S	N	S	S	N	N
	PSIE320425	Workplace Safety and Industrial Environment	2		N	S	S	N	H	H	H	S	H	S	S	N	N
	INRO321129	Industrial Robots	2		N	S	S	N	H	H	H	S	H	N	N	N	N
	NMME322725	Numerical Calculation in Mechanical Engineering	2		H	N	N	N	H	H	H	H	N	N	N	N	N
52	FAIN423025	Internship	2	8	N	N	H	H	H	H	H	H	H	H	H	H	H
53	GRAT403125	Capstone project	10	8	N	N	H	H	H	H	H	H	H	H	H	H	H
		Graduation Examination Courses															
	STOG443225	- Special Graduation Subject 1	4	8	N	N	H	H	H	H	H	H	H	H	H	H	H
	STOG433325	- Special Graduation Subject 2	3	8	N	N	H	H	H	H	H	H	H	H	H	H	H
	STOG433425	- Special Graduation Subject 3	3	8	N	N	H	H	H	H	H	H	H	H	H	H	H

Note: H - Highly Supportive; S - Supportive; P - Partly Supportive; N: Non-Supportive

Appendix 2: ***Matrix of courses vs. Expected learning outcomes of Machine Manufacturing Technology programme***

Expertise 2: Major in Machine Design

No	Code	Course	Credits	Semester	ELOs/Contribution level												
					ELO 01	ELO 02	ELO 03	ELO 04	ELO 05	ELO 06	ELO 07	ELO 08	ELO 09	ELO 10	ELO 11	ELO 12	ELO 13
1	MATH130101	Advanced Mathematics A1	3	1	P	N	N	N	N	N	N	P	N	N	N	N	N
2	ENGL130137	English 1	3	1	P	N	N	N	N	N	P	P	N	N	N	N	N
3	GCHE130103	General Chemistry A1	3	1	P	N	N	N	N	N	N	P	N	N	N	N	N
4	INME130125	Introduction to Mechanical Engineering	3	1	N	P	N	N	P	P	P	P	P	P	N	N	N
5	VBPR131085	Visual Basic Programming	3	1	N	P	N	N	P	N	N	P	N	N	N	N	N
6	MATH130201	Advanced Mathematics A2	3	1	S	N	N	N	N	N	N	S	N	N	N	N	N
7	GELA220405	General Law	2	1	N	N	N	N	N	N	N	P	P	N	N	N	N
8	PHED110513	Physical Education 1	1	1	N	N	N	N	P	N	N	P	N	N	N	N	N
9	MATH130301	Advanced Mathematics A3	3	2	H	N	N	N	N	N	N	H	N	N	N	N	N
10	MATH130401	Applied Probability & Statistics	3	2	H	N	N	N	N	N	N	H	N	N	N	N	N
11	LLCT150105	Basic principles of Marxism & Leninism	5	2	N	N	N	N	N	N	N	S	S	N	N	N	N
12	ENGL230237	English 2	3	2	S	N	N	N	N	N	S	S	N	N	N	N	N
13	PHYS130102	Fundamental Physics A1	3	2	S	N	N	N	N	N	N	S	N	N	N	N	N
14	PHED110613	Physical Education 2	1	2	N	N	N	N	S	N	N	S	N	N	N	N	N
	Choose three from the following elective General knowledge courses		6	2													
	GEEC220105	General Economics	2		N	N	N	N	S	S	N	S	N	N	N	N	N
	INMA220305	Introduction of Management	2		N	N	N	N	S	S	N	S	N	N	N	N	N
	INLO220405	Introduction to Logics	2		N	N	N	N	S	S	N	S	N	N	N	N	N
	ULTE121105	Learning Methods in University	2		N	N	N	N	S	S	N	S	N	N	N	N	N

No	Code	Course	Credits	Semester	ELOs/Contribution level												
					ELO 01	ELO 02	ELO 03	ELO 04	ELO 05	ELO 06	ELO 07	ELO 08	ELO 09	ELO 10	ELO 11	ELO 12	ELO 13
	SYTH220505	Systematic Thinking	2		N	N	N	N	S	S	N	S	N	N	N	N	N
	PLSK320605	Planning Skills	2		N	N	N	N	S	S	N	S	N	N	N	N	N
	IVNC320905	Introduction to Vietnamese Culture	2		N	N	N	N	S	S	N	S	N	N	N	N	N
	INSO321005	Introduction to Sociology	2		N	N	N	N	S	S	N	S	N	N	N	N	N
15	LLCT120314	Ho Chi Minh's Ideology	2	3	N	N	N	N	N	N	N	S	S	N	N	N	N
16	ENGL330337	English 3	3	3	H	N	N	N	N	N	H	H	N	N	N	N	N
17	PHYS120202	Fundamental Physics A2	2	3	H	N	N	N	N	N	N	H	N	N	N	N	N
18	PHYS110302	Experiment of Physics	1	3	H	N	N	N	N	N	N	H	N	N	N	N	N
19	THME230721	Theory of Mechanics	3	3	N	P	P	N	S	S	S	N	N	N	N	N	N
20	EDDG230120	Descriptive Geometry and Technical Drawing	3	3	N	P	P	N	S	S	S	N	N	N	N	N	N
21	ENMA220126	Materials Science	2	3	N	P	P	N	S	S	S	N	N	N	N	N	N
22	MHAP120227	Mechanical Works Practice	2	3	N	P	P	P	S	S	S	N	S	N	N	N	N
23	PHED130715	Physical Education 3 (Elective)	3	3	N	N	N	N	S	N	N	S	N	N	N	N	N
24	LLCT230214	Vietnamese Communist Party's revolutionary policies	3	4	N	N	N	N	N	N	N	S	S	N	N	N	N
25	TOMT220225	Tolerances and Measuring Techniques	2	4	N	S	S	N	S	P	P	S	N	N	N	N	N
26	TMMP230220	Theory of Machine and Machine design	3	4	N	S	S	N	S	S	S	N	N	N	P	N	N
27	STMA230521	Strength of Materials	3	4	N	S	S	N	S	S	S	S	N	N	N	N	N
28	EXMM210325	Experiment of Mechanical Measurement	1	4	N	P	S	P	S	N	P	N	P	N	N	N	N
29	MATE211126	Experiment on Materials Science	1	4	N	P	S	P	S	N	P	N	P	N	N	N	N
30	PEPR220426	Welding Practice	2	4	N	P	S	P	S	N	P	N	P	N	N	N	N

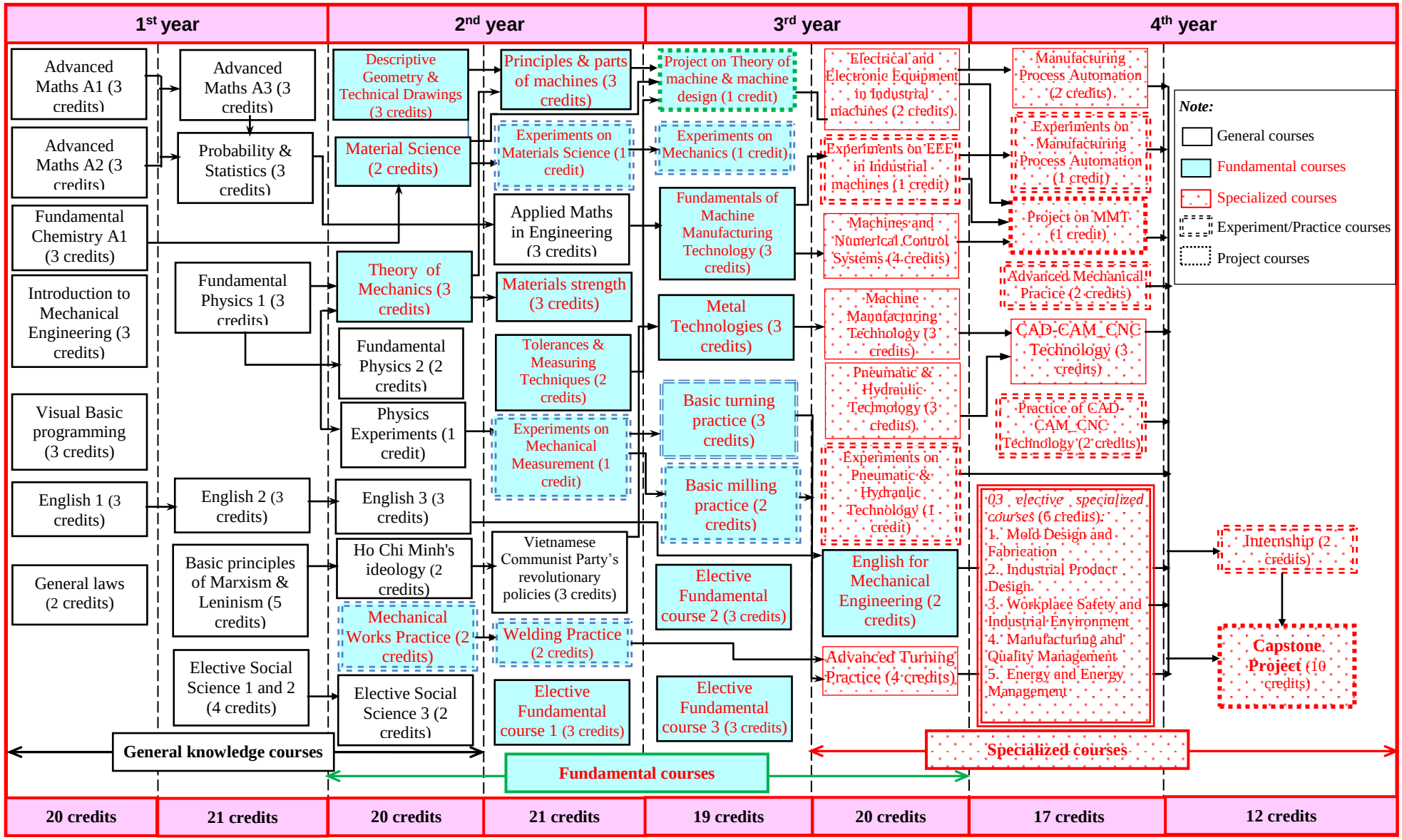
No	Code	Course	Credits	Semester	ELOs/Contribution level												
					ELO 01	ELO 02	ELO 03	ELO 04	ELO 05	ELO 06	ELO 07	ELO 08	ELO 09	ELO 10	ELO 11	ELO 12	ELO 13
31	MATH131501	Applied Mathematics in Engineering	3	4	H	S	N	N	N	N	N	H	N	N	N	N	N
	Choose one from the following elective fundamental courses		3	4													
	CADM230320	Computer-Aided Design	3		N	S	S	N	S	S	S	N	N	N	N	N	N
	EEEN230129	Electrical and Electronic Engineering	3		N	S	S	N	S	S	S	N	N	N	N	N	N
32	METE330126	Metal Technology	3	5	N	S	S	N	S	S	S	S	N	P	P	N	N
33	METE210321	Experiment of Mechanics	1	5	N	S	S	S	N	N	N	N	N	N	N	N	N
34	PMMD310423	Project on Theory of machine and machine design	1	5	N	S	S	N	S	S	S	N	N	N	P	N	N
35	FMMT330825	Fundamentals of Machine Manufacturing Technology	3	5	N	H	H	N	S	S	S	S	N	P	P	N	N
36	BATP230227	Basic Turning Practice	3	5	N	S	S	S	S	S	N	N	N	P	P	P	N
37	BAMP220327	Basic Milling Practice	2	5	N	S	S	S	S	S	N	N	N	P	P	P	N
	Choose three from the following elective fundamental courses		6	5													
	ENVI320921	Engineering Vibrations	2		N	S	S	N	S	S	S	S	N	N	N	N	N
	FLUI220132	Fluid Mechanics	2		N	S	S	N	S	S	S	S	N	N	N	N	N
	THER222932	Thermal Engineering	2		N	S	S	N	S	S	S	S	N	N	N	N	N
	OPTE322925	Optimization in Engineering	2		N	S	S	N	S	S	S	S	N	N	N	N	N
38	MTNC340925	Machines and Numerical Control Systems	4	6	N	H	H	S	S	S	S	S	N	S	S	N	P
39	MMAT431525	Machine Manufacturing Technology	3	6	N	H	H	N	H	H	S	S	N	S	S	N	P
40	PNHY330529	Pneumatic –Hydraulic Technology	3	6	N	H	H	N	H	H	S	S	N	S	S	N	P

No	Code	Course	Credits	Semester	ELOs/Contribution level												
					ELO 01	ELO 02	ELO 03	ELO 04	ELO 05	ELO 06	ELO 07	ELO 08	ELO 09	ELO 10	ELO 11	ELO 12	ELO 13
41	EPHT310629	Experiments of Pneumatic – Hydraulic Technology	**1**	**6**	N	**H**	**H**	**S**	**H**	**H**	**N**	**N**	**P**	**S**	**S**	**N**	**P**
42	ENME320124	English for Mechanical Engineering	**2**	**6**	**N**	**S**	**S**	**N**	**S**	**S**	**H**	**S**	**P**	**N**	**N**	**N**	**N**
43	TPRA340527	Advanced Turning Practice	**4**	**6**	**N**	**S**	**S**	**S**	**N**	**N**	**N**	**N**	**N**	**N**	**S**	**N**	**N**
44	CAEM430923	CAE in Machine Design	**3**	**6**	**N**	**S**	**S**	**N**	**S**	**S**	**S**	**S**	**N**	**N**	**S**	**N**	**N**
45	CCCT431725	CAD/CAM-CNC Technology	**3**	**7**	**N**	**S**	**S**	**N**	**S**	**S**	**S**	**S**	**N**	**N**	**S**	**S**	**N**
46	PCCC421825	Practice of CAD/CAM-CNC Technology	**2**	**7**	**N**	**S**	**S**	**H**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**
47	PMMT411625	Project on Machine Manufacturing Technology	**1**	**7**	**N**	**H**	**H**	**H**	**H**	**H**	**N**	**H**	**N**	**H**	**H**	**N**	**N**
48	MPRA320927	Advanced Mechanical Practice	**2**	**7**	N	**H**	**H**	**H**	**N**	**N**	**N**	**N**	**N**	**N**	**H**	**N**	**N**
49	MSSD430623	Machine system simulation design	**3**	**7**	N	**H**	**H**	**N**	**H**	**H**	**N**	**N**	**N**	**H**	**H**	**H**	**N**
	Choose three from the following elective Specialized Courses		**6**	**7**													
	MQMA321125	Manufacturing and Quality Management	**2**		**N**	**S**	**S**	**N**	**H**	**H**	**H**	**S**	**S**	**N**	**N**	**S**	**N**
	IMAS320525	Maintenance in Industry	**2**		**N**	**S**	**S**	**N**	**H**	**H**	**H**	**S**	**S**	**H**	**H**	**H**	**N**
	EIMA310625	Experiments on Maintenance in Industry	**1**		**N**	**S**	**S**	**H**	**H**	**H**	**H**	**S**	**S**	**H**	**H**	**H**	**N**
	MOLD431224	Mould Design and Fabrication	**3**		**N**	**S**	**S**	**N**	**H**	**H**	**H**	**S**	**N**	**N**	**N**	**N**	**N**
	DEIP331225	Industrial Product Design	**3**		**N**	**S**	**S**	**N**	**H**	**H**	**H**	**S**	**N**	**S**	**S**	**N**	**N**
	NTMP320725	Non-traditional Manufacturing Methods	**2**		**N**	**S**	**S**	**N**	**H**	**H**	**H**	**S**	**N**	**S**	**S**	**N**	**N**
	PSIE320425	Workplace Safety and Industrial Environment	**2**		**N**	**S**	**S**	**N**	**H**	**H**	**H**	**S**	**H**	**S**	**S**	**N**	**N**
	INRO321129	Industrial Robots	**2**		**N**	**S**	**S**	**N**	**H**	**H**	**H**	**S**	**H**	**N**	**N**	**N**	**N**

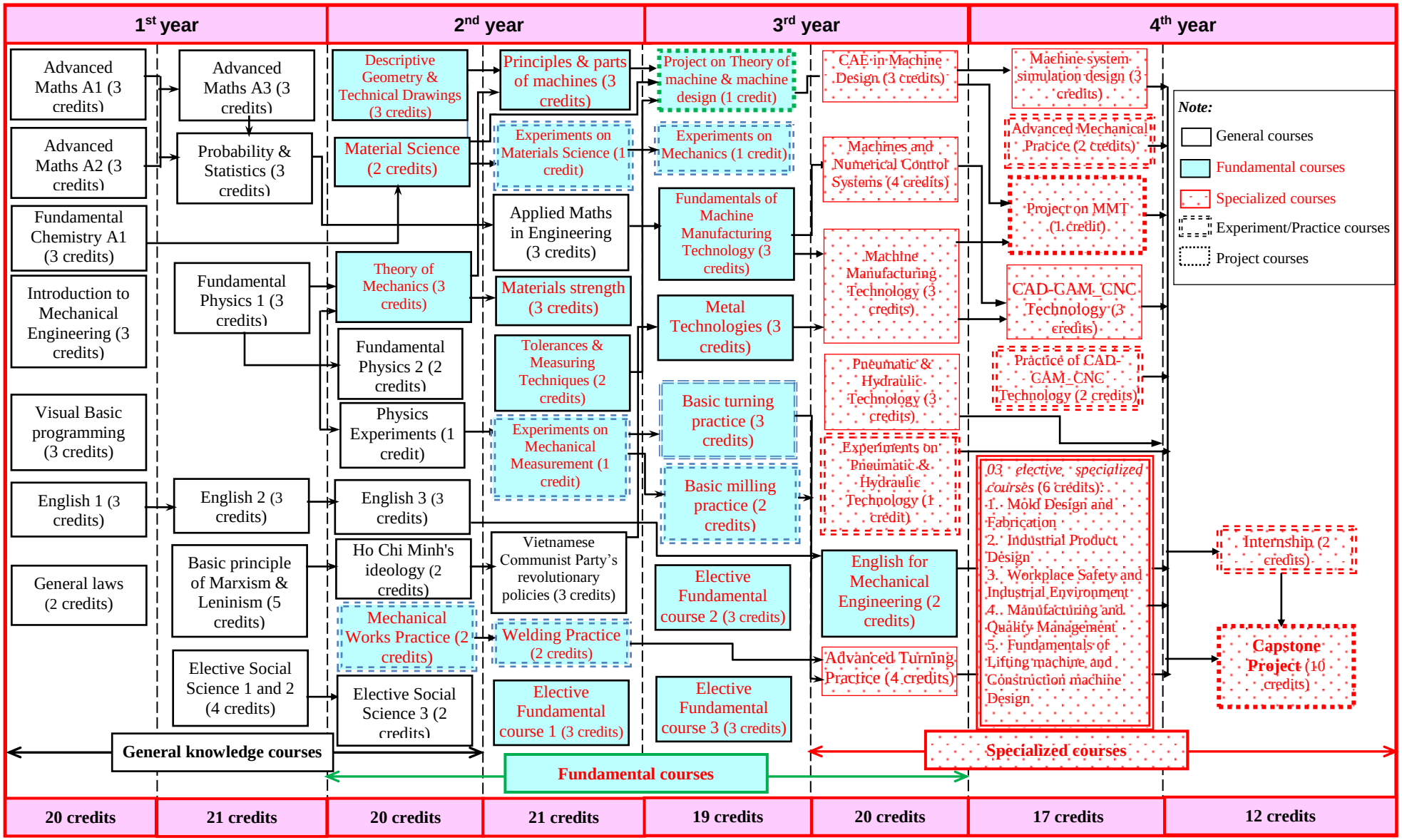
No	Code	Course	Credits	Semester	ELOs/Contribution level												
					ELO 01	ELO 02	ELO 03	ELO 04	ELO 05	ELO 06	ELO 07	ELO 08	ELO 09	ELO 10	ELO 11	ELO 12	ELO 13
	FLCD420523	Fundamentals of Lifting machine and Construction machine Design	**2**		**N**	**S**	**S**	**N**	**H**	**H**	**H**	**S**	**N**	**N**	**H**	**N**	**N**
	MEDI420823	Mechanical Design	**2**		**N**	**S**	**S**	**N**	**H**	**H**	**H**	**S**	**S**	**N**	**H**	**N**	**N**
	FDFP320720	Fundamentals of Designing Food Processing Machines	**2**		**N**	**S**	**S**	**N**	**H**	**H**	**H**	**S**	**H**	**N**	**N**	**N**	**N**
50	FAIN423025	Internship	**2**	**8**	**N**	**N**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**
51	GRAT403125	Capstone project	**10**	**8**	**N**	**N**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**
		Graduation Examination Courses															
	STOG443225	- Special Graduation Subject 1	**4**	**8**	**N**	**N**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**
	STOG433325	- Special Graduation Subject 2	**3**	**8**	**N**	**N**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**
	STOG433425	- Special Graduation Subject 3	**3**	**8**	**N**	**N**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**

Note: H - Highly Supportive; S - Supportive; P - Partly Supportive; N: Non-Supportive

Appendix 3: Currirculum map (Expertise 1)



Curriculum map (Expertise 2)



Appendix 4: Matrix of Extracurriculum activities vs. Expected learning outcomes

No	Activities	ELOs/Contribution level												
		01	02	03	04	05	06	07	08	09	10	11	12	13
1	National Entrance Exam Supports	**N**	**N**	**N**	**N**	**P**	**N**	**N**	**P**	**N**	**N**	**N**	**N**	**N**
2	Green Summer Volunteer Campaign	**N**	**N**	**N**	**N**	**P**	**P**	**N**	**P**	**N**	**N**	**N**	**N**	**N**
3	Environmental hygiene	**N**	**N**	**N**	**N**	**P**	**P**	**N**	**P**	**N**	**N**	**N**	**N**	**N**
4	Field trips	**N**	**N**	**N**	**N**	**P**	**P**	**P**	**P**	**S**	**N**	**N**	**N**	**N**
5	Social Union Activities	**N**	**N**	**N**	**N**	**S**	**P**	**N**	**P**	**N**	**N**	**N**	**N**	**N**
6	English club	**N**	**N**	**N**	**N**	**S**	**S**	**H**	**S**	**N**	**N**	**N**	**N**	**N**
7	Soft skills clubs	**N**	**N**	**N**	**N**	**H**	**S**	**N**	**H**	**H**	**N**	**N**	**N**	**N**

Note: H - Highly Supportive; S - Supportive; P - Partly Supportive; N: Non-Supportive

Appendix 5: Feedback from stakeholders and responsive actions of MMT Department for curriculum improvement

Academic year	Stakeholders	Recommendations	Responsive actions	Evidences
2012	Employer	Just graduated engineers don't have enough Pork-ready skills	Increase the number of credit of capstone project from 7 to 10 to integrate more Working skills for students	Syllabus of capstone project
2013	Alumni	Some MMT engineers doesn't know how to design pneumatics and hydraulic systems	Bring Pneumatics and Hydraulics technology to compulsory courses list	Curriculum
2014	Teaching staffs	The evaluation for the project of manufacturing technology is not consistent among teachers	Design and develop rubric for the evaluation	Project rubric
2015	Employer	Improve the practicing skills in CNC machining	Increase the number of credits for CAD/CAM-CNC technology	Course syllabus

Appendix 6: List of publications published in the period of 2012-2017 by lecturers

1. **Do Van Hien**, Nguyen Xuan Hung. *Limit and shakedown isogeometric analysis of structures based on Bézier extraction*. European Journal of Mechanics - A/Solids, Elsevier, Volume 63, May–June 2017, Pages 149–164, ISSN: 0997-7538.

2. **Do Thanh Trung, Tran Minh The Uyen, Pham Son Minh**. *Numerical Study on the Flow Length in an Injection Molding Process With an External Air-Heating Step*. Int. Journal of Engineering Research and Application, Int. Journal of Engineering Research and Application, Vol. 7, Issue 4, pp.85-89 (Part -2), 2248-9622, Mar 2017.

3. **Do Thanh Trung, Tran Minh The Uyen, Pham Son Minh**. *Study On The External Gas-Assisted Mold Temperature Control For Thin Pall Injection Molding*. Int. Journal of Engineering Research and Application, Int. Journal of Engineering Research and Application, Vol. 7, Issue 3, pp.15-19 (Part -2), ISSN 2248-9622, Mar 2017.

4. **Pham Son Minh, Do Thanh Trung, Tran Minh The Uyen**, Phan The Nhan. *A Study on the Welding Line Strength of Composite Parts Pith Various Venting Systems in Injection Molding Process*. Key Engineering Materials, Trans Tech Publications, Switzerland, Vol. 737, pp 70-76, 1662-9795, June 2017.

5. **Pham Huy Tuan**, Minh-Nhat Le, Van-Trinh Mai. *A Novel Multi-axis Compliant Prosthetic Ankle Foot to Support the Rehabilitation of Amputees*. The 3rd International Conference on Green Technology and Sustainable Development, GTSD 2016, 24-25 November 2016, Kaohsiung, Taiwan, ISBN 978-1-5090-3638-7, DOI 10.1109/GTSD.2016.61, pp 238-241.

6. **Phan Cong Binh**, Tri Dung Dang, Hoai Vu Anh Truong, Chau Duy Le, Minh Tri Nguyen, Kyoung KPan Ahn. *A study on modeling of a hybrid Wind Pave energy converter system*. 016 16th International Conference on Control, Automation and Systems (ICCAS 10/2016).

7. **Dang Thien Ngon**, Dat Le Quang, Toan Phan Van, Tuan Tao Anh. *A Welding Temperature Determination Method of LoP Carbon Steel and Stainless Steel Pelded Joint by Rotary Friction Welding Process*. The 3rd International Conference on Green Technology and Sustainable Development, GTSD 2016, 24-25 November 2016, Kaohsiung, Taiwan, ISBN 978-1-5090-3638-7, DOI 10.1109/GTSD.2016.55, pp 206-211.

8. **Dang Thien Ngon**, Giang Nguyen Truong. *An Approach To Design A Globoid CAM Using CREO Parametric 3.0*. The 3rd International Conference on Green Technology and Sustainable Development, GTSD 2016, 24-25 November 2016, Kaohsiung, Taiwan, ISBN 978-1-5090-3638-7, DOI 10.1109/GTSD.2016.54, pp 200-205.

9. **Le Hieu Giang, Truong Nguyen Luan Vu, Le Linh**. *Analytical Design of IMC-PID Controller for Ideal Decoupling Embedded in Multivariable Smith Predictor Control System*. International Journal of Electrical, Computer, Energetic, Electronic and Communication Engineering, Vol. 10, No. 7, 850-854, May 2016.

10. **Tuong Phuoc Tho, Nguyen Truong Thinh**, Nguyen Huy Bich. Design and development of the vision sorting system. The 3rd International Conference on Green Technology and Sustainable Development, GTSD 2016, 24-25 November 2016, Kaohsiung, Taiwan, ISBN 978-1-5090-3638-7, DOI 10.1109/GTSD.2016.57, pp 217-223.

11. **Le Linh, Truong Nguyen Luan Vu, Le Hieu Giang**. *Design of IMC-PID Controller Cascaded Filter for Simplified Decoupling Control System*. International Journal of Electrical, Computer, Energetic, Electronic and Communication Engineering, Vol. 10, No. 7, 869-884, 05/2016.

12. **Truong Nguyen Luan Vu, Le Linh, Le Hieu Giang**. *Fractional-Order PI Controller Tuning Rules for Cascade Control System*. International Journal of Electrical, Computer, Energetic, Electronic and Communication Engineering, Vol. 10, No. 7, 854-858, May 2016.

13. **Le Minh Tai**, Shyh-Chour Huang. *Effect of Nano-fillers on the Strength Reinforcement of Novel Hybrid Polymer Nanocomposites*. Materials and Manufacturing Processes, Volume 31, Issue 8, 8/2016, online 5/2015.

14. Nguyen Tan Viet Tuyen, **Nguyen Truong Thinh**, Dang Thai Son. *Gait of Quadruped Robot and Interaction Based on Gesture Recognition*. Journal of Automation and Control Engineering Vol. 4. No. 1. February 2016, ISSN: 2301-3702, pp 53-58.

15. Le Phan Hung, **Nguyen Truong Thinh, Tuong Phuoc Tho**. *Kinematic Analysis and Development Five-axis Milling Machine Based on Parallel Mechanisms*. The 3rd International Conference on Green Technology and Sustainable Development, GTSD 2016, 24-25 November 2016, Kaohsiung, Taiwan, ISBN 978-1-5090-3638-7, DOI 10.1109/GTSD.2016.42, pp 145-154.

16. Shyh-Chour Huang, **Le Minh Tai**. *Optimal design of process parameters, experimental fabrication and characterisation of a novel hybrid polymer nanocomposite*. International Journal of Materials and Product Technology, Vol. 52, Nos. 3/4, pp. 362-380, 4/2016.

17. **Nguyen Truong Thinh**, Nguyen Trong Tuan, Le Phan Hung. *Predictive Controller for Mobile Robot based on Fuzzy logic*. The 3rd International Conference on Green Technology and Sustainable Development, GTSD 2016, 24-25 November 2016, Kaohsiung, Taiwan, ISBN 978-1-5090-3638-7, DOI 10.1109/GTSD.2016.41, pp 141-144.

18. Le Phan Hung, Tran Tuyet Quyen, **Nguyen Truong Thinh**. *Research and Applying Computer Vision for Controlling The School of Fish Robots Using SParm Model*. The 3rd International Conference on Green Technology and Sustainable Development, GTSD 2016, 24-25 November 2016 • Kaohsiung, Taiwan, ISBN 978-1-5090-3638-7, DOI 10.1109/GTSD.2016.56, pp 212-216.

19. Tien Tran Minh, **Le Chi Cuong**, Nguyen Vinh Phoi. *Study of strain and residual stress distribution in the thickness direction by layers removal method and x-ray diffraction*. The 3rd International Conference on Green Technology and Sustainable Development, GTSD 2016, 24-25 November 2016, Kaohsiung, Taiwan, ISBN 978-1-5090-3638-7, DOI 10.1109/GTSD.2016.43, pp 155-160.

20. Phoi Nguyen Vinh, **Cuong Le Chi**, **Dang Thien Ngon**. *Study of strain and residual stress distribution in the thickness direction by layers removal method and x-ray diffraction*. The 3rd International Conference on Green Technology and Sustainable Development, GTSD 2016, 24-25 November 2016, Kaohsiung, Taiwan, ISBN 978-1-5090-3638-7, DOI 10.1109/GTSD.2016.40, pp 135-140.

21. **Cai Viet Anh Dung**, Aurélien Ibanez, Consuelo Granata, Viet Thang Nguyen, Minh Tam Nguyen. *Transparency enhancement for an active knee orthosisby a constraint-free mechanical design and a gait phasedetection based predictive control*. Meccanica/Springer, Print ISSN 0025-6455. Online ISSN 1572-9648, Meccanica: Advances in Biomechanics: from foundations to applications. First Online: 14 November 2016. DOI: 10.1007/s11012-016-0575-z.

22. **Tran Ngoc Dam**, Do Van Dung. *Treatment Exhaust Gas From Engine by Plasma at Atmospheric Pressure*. The 3rd International Conference on Green Technology and Sustainable Development, GTSD 2016, 24-25 November 2016 • Kaohsiung, Taiwan, ISBN 978-1-5090-3638-7, DOI 10.1109/GTSD.2016.59, pp 228-230.

23. **Pham Huy Tuan**, **Nguyen Xuan Quang**, **Nguyen Ngoc Phuong**. *Design and Fabrication of a High-Intensity Ultrasonic Transducer for Food Dehydration (in Vietnamese)*. J. Science & Technology: Technical Universities, Vol. 110, 2016.

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25. **Nguyen Truong Thinh**, **Nguyen Ngoc Phuong**, Nguyen Trong Tuan. *Planning Walking trajectory for a biped robot*. Proceedings of the 4th National Conference on Mechanical Science &Technology, HCMC November 6th, 2015, vol. 2, pp. 3-12.

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27. **Dang Thien Ngon**, Phan Van Toan. *Research and proposal on welding technique for longitudinal crack defect welding*. International Journal of Mechanical Engineering and Applications, Science Publishing Group, ISSN 2330-0248, Vol. 3, No 1-3, 2/2015: Pp. 29-34.

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30. **Dang Thien Ngon**, Ton That Tin, Duong Van Ba. *Effect of nozzle structure on the peeling ability of garlic peeled by pneumatic*. Proceedings of the 4th National Conference on Mechanical Science &Technology, HCMC November 6th, 2015, vol. 1, pp. 53-60.

31. **Dang Thien Ngon**, Huỳnh Tấn Đạt. *Simulation to determine the structure of windcube for small horizontal-axis wind turbine*. Proceedings of the 4th National Conference on Mechanical Science &Technology, HCMC November 6th, 2015, vol. 1, pp. 594-601.

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34. **Pham Son Minh, Do Thanh Trung, Tran Minh The Uyen**, Phan Thế Nhân. *Effect of part thickness and mold temperature on the warpage of polypropylene plate*. Proceedings of the 4th National Conference on Mechanical Science &Technology, HCMC November 6th, 2015, vol. 2, pp. 536-543.

35. **Do Thanh Trung, Pham Son Minh**. *Effect of temperature control on the pulsed cooling process in injection molding Pith P20 mold steel and polycarbonate material.* Journal of Science & Technology - Technical Universities, No. 104, 2015, p. 78-82.

36. **Le Linh, Truong Nguyen Luan Vu, Le Hieu Giang**. *Design of multi-loop controller for simplified decoupling system.* Proceedings of the 4th National Conference on Mechanical Science &Technology, HCMC November 6th, 2015, vol. 2, pp. 23-29.

37. **Dang Minh Phung, Le Hieu Giang**, Nguyen Van Lam, Nguyen Truong Hai, Le Tan Cuong. *Reseaching design and manufacturing 4-axis CNC milling machine using Mach3 software applied to manufacture aluminium and ferrous metals.* Proceedings of the 4th National Conference on Mechanical Science &Technology, HCMC November 6th, 2015, vol. 1, pp. 112-120.

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39. Lê Phan Hưng, **Nguyen Truong Thinh**. *Driving kinetic model and combining control method on autonomous car*. Proceedings of the 4th National Conference on Mechanical Science &Technology, HCMC November 6th, 2015, vol. 2, pp. 30-38.

40. **Nguyen Minh Khai**, YoungCheol Lim, Sung-Jun Park. *A Comparison Between Single-Phase Quasi Z-Source and Quasi-Switched Boost Inverters*. Industrial Electronics, IEEE Transactions on Volume: 62, Issue: 10, Page(s): 6336 - 6344, ISSN : 0278- 0046, Oct. 2015

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46. **Nguyen Truong Thinh, Tuong Phuoc Tho, Nguyen Ngoc Phuong**. *Design and development reception robot*. Proceedings of the 4th National Conference on Mechanical Science &Technology, HCMC November 6th, 2015, vol. 2, pp. 217-224.

47. **Thai Van Phuoc, Tran Ngoc Dam**. *Effects of cold-plasma at atmospheric pressure on killing of saureus on cold tissue*. Proceedings of the 4th National Conference on Mechanical Science &Technology, HCMC November 6th, 2015, vol. 1, pp. 654-658.

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52. **Pham Thi Hong Nga**, Vo Ngoc Yen Phuong, Tran Ngoc Thien, Tran The San, Yehua JIANG. *MICROSTRUCTURE AND HIGH-TEMPERATURE WEAR BEHAVIORS OF Co/tic LASER COATINGS ON TOOL STEEL*. Proceedings of the 4th National Conference on Mechanical Science &Technology, HCMC November 6th, 2015, vol. 2, pp. 378-385.

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