HANOI UNIVERSITY
OF SCIENCE
AND TECHNOLOGY

ASEAN
University
Network

AUN-QA
SELF-ASSESSMENT REPORT

ELECTRICAL ENGINEERING

June 2019

ABBREVIATIONS

AUN	ASEAN University Network
AUN-QA	ASEAN University Network – Quality Assurance
CDIO	Conceive – Design – Implement – Operate
CEA	Control and Automation Engineering (program)
CPA	Cumulative Point Average
EE	Electrical Engineering (program)
EVN	Electricity of Vietnam
FTE	Full-Time Equivalent
HUST	Hanoi University of Science and Technology
ICT	Information and Communication Technology
MOET	Ministry of Education and Training
MOU	Memorandum Of Understanding
PVN	PetroVietnam
SEE	School of Electrical Engineering

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PART I INTRODUCTION

Executive Summary

Established in 1956, Hanoi University of Science and Technology (HUST) is Vietnam's first multidisciplinary technical university [EE 00.01]. It is the industrial engineer training center of the country during building and development processes, and the cradle of high-quality human resources for the country's modernization and industrialization.

In its early days, the whole University concentrated its efforts on settling facilities for classrooms and laboratories by renovating and buying new equipment; and at the same time, on the development of managerial and teaching staff to prepare basic conditions for the opening of the First Cohort.

In line with the world's integration and development tendency, and with open cooperation policies aimed to improve the quality of research and technology transfer, HUST is a prestigious address for foreign and domestic technology development investors, businesses and financial institutions.

Through over 60 years of building and development, HUST has constantly been reforming its leadership and management practices, upgrading training programs, advancing the expertise of lecturers and staff, modernizing facilities and equipment for teaching and research activities to gradually catch up with the development of global education.

Mission, vision and core values

Mission: A commitment to human development, high-quality workforce training, scientific research, technological innovation and knowledge transfer that serves our country and global society.

Vision: To become a leading research university rooted in the technical and technological fields; to make significant contributions that develop a knowledge-based economy and maintain national peace and security, and to be a pioneer in growing and sustaining Vietnam's higher-education system.

Core values

Academic Excellence - Effectiveness: We are committed to academic excellence and optimal effectiveness throughout every aspect of our university

Dedication - Commitment: We value the dedication and full commitment as the greatest values of generations of HUST staff and students.

*Integrity - Respect***:** We value integrity in professional and social life, respect for dignity, regard for our laws and regulations, and respect for the diversity and inclusivity of our community.

Individual talent – Collective brainpower: We value the success of the individual creativity and talent as key elements for successful breakthroughs - while also valuing the power of collective brainpower to ensure sustainable innovation and growth.

*Inheritance – Creativity***:** We ensure that innovative and creative thinking, based on quintessential intellect, inherit existing achievements and promote traditional values.

To achieve the above objectives, Hanoi University of Science and Technology has set the development orientations in the coming periods as follows:

- Reforming the university administration into an enterprise model, implementing the autonomous model with social responsibility, regarding students as the main subject and the center of all activities. Education and research are first to serve the socio-economic development of the country, at the same time creating products that are globally competitive. Respecting the market mechanism but not developing towards commercialization.
- Evolving towards international integration, applying regional and international quality standards, wisely selecting and apply successful models and experiences of world-renowned universities. Focusing on substantive capacity development while orienting to international ranking criteria.
- Focusing on quality, not the total size of training. Exploiting and promoting the core strengths in high-quality training, high-level training and research, with priority given to a number of scientific and technological domains that play a key role in the economy and the industrial revolution 4.0.
- Developing broad-based curriculums with postgraduate orientations in the areas of application and research. Equipping learners with a solid foundation and at the same time developing the practical ability and the adaptability in the international environment. Strongly reforming pedagogical methodology and applying new educational technologies, promoting self-learning through research, creation, and experimentation.
- Harmonious development and closely linking basic research and applied research; linking research and training, innovation and entrepreneurship; promoting knowledge transfer and product commercialization; focusing on improving performance and developing research potential.

Prior to 2009, the **training model** of the University was 5 + 1 + 3 (5 years for Engineer degree, 1 year for Master degree and 3 years for Ph.D. degree). It is now replaced by the 4+1+1+3 model (4 years for Bachelor degree, 1 year for Engineer degree and 3 years for Ph.D.). or 4+2+3 (4 years for Bachelor degree, 2 years for Master degree and 3 years for Ph.D. degree). This training model is first applied in Vietnam, which is close to the training models in the world and is now being introduced by the Ministry of Education and Training to its training models and the Law on Higher Education.

The university was given the right to become a fully autonomous university by the Prime Minister of the Socialist Republic of Vietnam in October 2016. Based on that, the university is rebuilding the University regulation, restructuring the university units to ensure a neat and effective mechanism to successfully fulfill the mission [EE 00.02].

After 60 years of development, Hanoi University of Science and Technology has trained over 2,117,000 engineers and bachelors, 9,000 Masters, 600 PhDs serving in the fields of economics, industry, national defense, security, management, etc. Many graduates have become top scientists, top managers, generals, business owners and politicians of the country.

With modern models, programs and international integration, the University has been strongly promoting research, technology transfer and product development, this is an important factor in improving the training quality, a measure of the prestige and the University's level. The active position of Hanoi University of Science and Technology in international cooperation

has given the University a boost, especially in recent years. At present, the University has cooperation in training, scientific research with more than 200 universities, research centers, research, and educational institutions from 32 countries around the world, also is a member of 8 international universities networks. Through international relations, the university has sent about 500 staff and students abroad for studies and research, etc. Realizing several international projects on training and research, contributing to strengthen the university facilities. The University also has established a quality management system for training and scientific research in accordance with international standards ISO 9001: 2008.

The University's facilities

- The technical infrastructure of the University for training, scientific research, technology transfer and diverse activities includes dozens of high-rise buildings with a total area of over 20 thousand m2.

- More than 200 lecture halls, classrooms, large halls and a system of conference rooms.

- Nearly 200 laboratories, including 8 national and key laboratories and 20 workshops.

- The University has an internal network BKNet connected to the internet. The library is the largest and most modern library in Vietnam.

- Student residence area is nice and clean.

- The sports complex of the university includes multi-purpose stadiums, gymnasiums, swimming pools, tennis courts.

Quality assurance activities at HUST

The University has shown great concern for Quality Assurance with early establishment of the Center for Quality Assurance (CEQUA) upon the Decree No 1578-QĐ-ĐHBK-TCCB of September 30th, 2008 signed by President of HUST. The main function of CEQUA is to develop and implement quality assurance (QA) processes within HUST. HUST is one of the first universities to implement Institution Quality Assessment based on Quality standards by MOET in 2006 and self-assessment and external audit basing on MOET's quality standards in 2009. Recently, HUST officially received HCERES's Decision on recognition of educational quality at institutional level (http://www.hceres.fr/) for five years from June 2017 to June 2022 without any further conditions.

To develop strategic plans for HUST to join international and regional QA networks, HUST is the member of AUN-QA in November 2015 and is the member of APAQA-HE in 2016.

For the accreditation to meet international criteria at Programme level, HUST has performed self-assessment for different undergraduate training programmes:

- 2009: Self-assessment and External audit of 2 high-quality PFIEV engineering training programmes (Mechanical Engineering and Electrical Engineering) basing on CTI (*Commission des titres d'ingénieurs*) criteria.
- 2012 - 2013: Self-assessment and External audit of Communications and Computer Network programme basing on AUN-QA criteria under European peer review. Self-assessment of Mechatronics and Materials Engineering programmes basing on ABET standards.
- 2013: Self-assessment of programmes in Electrical Engineering, Electronic Engineering and Chemical Engineering basing on AUN criteria.

- 2014 - 2015: Self-assessment of 3 talented programmes: Automatic control, electronics, and telecommunication, organic and petrochemical technology.
- 2015: Self-assessment of 2 high-quality PFIEV engineering training programmes basing on CTI criteria. Self-assessment of 3 advanced programmes on Mechatronics, Materials Science and Engineering and Biomedical Engineering programmes basing on AUN criteria.
- HEEAP2 project, Joint initiative by AUN, AQAN, DAAD, ENQA, HRK, SEAMEO RIHED with the view to strengthen the IQA & EQA capacity through dialogue and training events.
- July 2017: Self-assessment and External 1 audit of 3 advanced programmes on Mechatronics, Materials Science and Engineering and Biomedical Engineering programmes basing on AUN criteria. To be qualified by international and regional standards in higher education and training, SCE has also performed different activities to review and self-assess undergraduate training programmes.
- October 2017: Self-assessment and External 2 audit of 4 programmes on Mechatronics Engineering, Electronics and Telecommunications Engineering, Chemical Engineering and Electronics and Telecommunications Engineering.
- In 2018 HUST has implemented 8 AUN-QA Self-Assessment reports such as Control Engineering and Automation, Electrical Engineering, Transport Mechanical Engineering, Aeronautical Engineering, Mechanical Engineering, BioEngineering, Printing Engineering and Food Engineering.

Introduction to the School of Electrical Engineering

The School of Electrical Engineering is one of the first units established in HUST in 1956 [EE 00.03]. After some changes in the organizational structure as well as in the administration system, in December 2010, the Faculty of Electrical Engineering was converted into the School of Electrical Engineering (SEE). SEE has a good reputation in training, researching and technology transferring. Over the past 60 years of development, generations of teachers and students are always proud of significant contributions to the building of the nation.

The teaching staff number in the School of Electrical Engineering is 135 including 2 Professors, 14 Associate Professors, 50 Doctors, and 56 Masters, doing research and training in various fields: control and systems, electrical systems, electromagnetic fields, electrical machines, electric transmission and electronic power, signal measurement and processing, etc. Currently, SEE is equipped with a modern laboratory system of 21 laboratories serving more than 50 teaching subjects to meet the requirements of training from basics to advance in the fields of electrical engineering and automation. The School of Electrical Engineering has active cooperation with many large industrial groups such as Siemens, ABB, GE, Schneider Electric, Texas Instruments, etc. Many laboratories with state-of-the-art equipment have been financed and are updated continuously in line with the development of the modern industry.
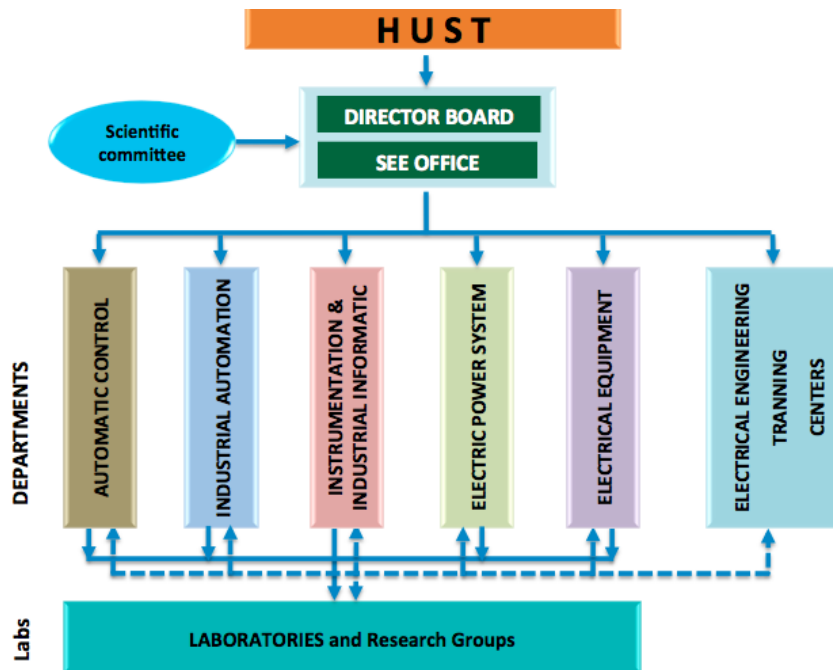
Figure 0-1 Organization chart of SEE.

Education: The School conducts all types of training: Full-time, part-time education, and second-degree Engineer. Special programmes such as the one for talented students in automatic control engineering, high-quality engineering programme (Informatics Industry), advanced programme (conducted in English) [EE 00.04].

Master of Science and Master of Engineering in Control & Automation Engineering, Power Engineering and Measurement Engineering & Control Systems [EE 00.05].

Doctoral programs in Network and Electrical Systems, Electrical Equipment, Automation, Control Theory and Optimal Control, Measurement [EE 00.06].

Short-term courses for advanced and industrial training.

There are many generations of lecturers and graduates who have actively participated in the development of Vietnam's power industry, modernization of industrial plants and transfer of modern technologies. After graduation, students from the School of Electrical Engineering can continue to improve their professional skills in different types of industries such as:

- Industrial enterprises of Vietnam Electricity Corporation (EVN), Cement Corporation, Petroleum Corporation (EVN), General Department of Metrology, Equipment Manufacturing Enterprise, etc.
- Foreign companies working in the fields of electricity like SIEMENS, ABB, GE, Schneider Electric, Tabuchi, Mitsubishi, Canon, ...
- Research institutes: Energy Institute, Measurement Institute, Institute of Information Technology, Institute of Physics, Institute of Mechanical Engineering, etc.

In addition, there are many opportunities for further studies to improve their professional and academic qualifications and to participate in research and development organizations in science and education.

Objectives: The School of Electrical Engineering is always the leader of the University in research and training; renovates the curriculums to meet the requirements of the society: being

modern and highly integrated, being able to provide advanced training in the field of Electrical Engineering and Control Engineering & Automation.

Vision: Maintaining the leading position in Vietnam's electricity industry; ranking at the same level with universities in the region; providing technical and research personnel for national and international needs; being the trusted research and technology transfer partner and being the leader in the country in the field of electrical engineering and automation.

The school offers two main undergraduate programs:

- **Electrical Engineering (EE)**
- **Control and Automation Engineering (CEA)**

The teaching staffs of SEE teach students in both EE and CEA programs. Students in EE and CEA share the same teaching facilities and other HUST facilities. Both programs are under the same management system of the School, the Academic Advisory Board.

This report covers the self-assessment of the Electrical Engineering program.

Table 0-1.The Electrical Engineering Curriculum

Program name	Electrical Engineering
Degree	Electrical Engineer
Starting year	2009
Type of training	Full time
Program code	52520216

The SAR teams

The School of Electrical Engineering has made decision No. 91b on September 4th, 2017 to establish a team for self-assessment and reporting [EE 00.07]

- Associate Prof. Nguyễn Thị Lan Hương (former Vice-Dean of SEE)
- Dr. Nguyễn Đức Huy – Vice Dean of See
- Dr. Nguyễn Thị Hoài Thu (Department of Electric power systems)
- Dr. Nguyễn Nga Việt (Department of Electrical and Electronic Equipment)
- Dr. Lã Minh Khánh, Deputy Director, Department of Electric power systems

During the preparation of this report, the SAR team has received tremendous support from the Departments in SEE, the office of Quality Assurance, the Academic Office. The report draft was also circulated to selected stakeholders, lecturers, students, alumni and employers for feedback.

Conforming to the "*Guide to AUN-QA assessment at programme level*", the SAR report consists of 4 parts:

1. Part 1: Introduction (overview of the University, School of Electrical Engineering and Departments)
2. Part 2: AUN-QA criteria requirements (analyzing each criterion, explaining and making comments to clarify the current status of the School)

3. Part 3: Strength and weakness analysis (promoting strength and giving solutions to existing problems in order to improve the quality of the School activities)
4. Part 4: Appendices (List of evidence)

PART II   AUN-QA CRITERIA REQUIREMENTS

Criterion 1   Expected Learning Outcomes

The curriculum of Electrical Engineering was inherited from the curriculum of Engineer in Electrical-Electronic Equipment and Power System. By 2007, the program was converted to a credit-based training system, which was modified from the K48 program of Electrical Engineer with 2 majors: *Electrical-Electronic Equipment*, and *Power Systems*. After two years of running the credit-based program, through surveying the needs of society, the Ministry has allowed the University to build a new training model (CT- 2009: bachelor – engineer – master) or CT4+1+1 for short.

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

Since 2009, according to the curriculum development plan of the University, based on the CDIO training curriculum standards, with the mission and vision of the University [EE 01.01.01], the program learning outcomes have been defined [EE 01.01.02]. HUST and SEE appointed a Curriculum Design Committee, which oversees reviewing the existing curriculum, and developing the new revised Program in EE [EE 01.01.03, EE 01.01.04].

Table 1-1. Mission and vision of HUST.

Mission	Vision
A commitment to human development, high-quality workforce training, scientific research, technological innovation and knowledge transfer that serves our country and global society.	To become a leading research university rooted in the technical and technological fields; to make significant contributions that develop a knowledge-based economy and maintain national peace and security, and to be a pioneer in growing and sustaining Vietnam's higher-education system.

Based on the visions and mission of HUST, and the vision of the SEE's Education Program Development Team, the Expected Learning Outcomes are defined, as shown in Table 1-2.

Table 1-2. Expected Learning Outcomes – Electrical Engineering

Learning Outcomes	Generic outcomes	Specific outcomes
1. Solid professional knowledge to be well adapted to different tasks such as research, development, consulting, management and production in the broad field of Electrical Engineering		
1.1 The ability to apply the basic knowledge of mathematics, physics, and computing in the calculation and simulation of electrical equipment and power systems		x
1.2 The ability to apply basic knowledge of circuit theory, electric machine, control systems, power systems, electronic		x

engineering in research, analysis of electrical equipment and power systems		
1.3 The ability to apply the core and advanced knowledge in electrical equipment and power systems combined with the ability to exploit the use of software tools in the design, implementation, and evaluation of electrical equipment and power systems.		x
2. Professional skills and personal qualities needed to succeed at work		
2.1 Analytical and problem-solving skills 2.2. Ability to carry out experiments, to do research and to explore knowledge 2.3. System thinking and critical thinking 2.4. Dynamic, creative and serious in work 2.5. Professional ethics and responsibilities 2.6. Understanding contemporary issues and lifelong learning	x	
3. Social skills needed to work effectively in a multi-disciplinary team and an international environment		
3.1 Organizational skills, leadership and teamwork (multi-disciplinary)	x	
3.2 Effective communication skills through writing, presenting, discussing, negotiating, mastering situations, using effective and modern tools.	x	
3.3 Effective usage of English at work, TOEIC score $\geq$ 450		x
4. Capacity for project planning, design, implementing and operating of electrical equipment and power systems in accordance with the economic, social and environmental context		
4.1 Awareness of the essential relationship between electrical equipment & systems solutions with economic, social and environmental factors in the globalized world	x	
4.2 Capability to identify problems and formulate solution ideas, to propose and develop electrical engineering projects and applications	x	
4.3 Capability to design electrical-electronic equipment and power systems		x
4.4 Capability to deploy, adjust and put into operation the electrical equipment and power systems		x

4.5 Capability for operation and maintenance of electrical equipment and power systems		x
5. Political awareness, spirit of serving the people and the country, having good health, meeting the requirements for building and defending the country		
5.1 Having the level of political understanding according to the common requirements of the Ministry of Education and Training	x	
5.2 Having a Physical Education Certificate and a Certificate of National Defense Education according to the requirement of the Ministry of Education and Training		x

The ELOs have been formulated following the missions and the visions of HUST. The ELOs also describes in detail the sets of professional skills that suit the requirements of the workforce in the power engineering field. The ELOs also clearly defines essential personal and social skills that are needed in the modern international and inter-disciplinary workplace.

1.2   The expected learning outcomes cover both generic and specific subject

In the process of defining the ELOs, the Curriculum Design Committee based on the guideline for educational reform of CDIO[1] and the guide to curriculum design process issued by the Academic Office [EE 01.02.01], drafted and circulated the ELOs to the school professors and lecturers, industry partners, alumni and students for feedback. Besides, conforming to the Vietnam Law on Higher Education [EE 01.02.02], MOET's regulation on the credit-based training program [EE 01.02.03], and HUST regulation [EE 01.02.04], the ELOs also cover skills related to political awareness, ethics, and knowledge of national security. The ELOS cover both generic and specific subject, as shown in Table 1-2. The contribution of each course in the program ELOs is clearly defined during the development of the program curriculum [EE 01.02.05].

1.3   The expected outcomes clearly reflect the requirements of the stakeholders

In the process of defining the ELOs, besides the CDIO implementation guides, the Curriculum Design Committee have consulted the opinion from lecturers and staff of SEE, as well as from the alumni, senior-year students [EE 01.03.01, EE 01.03.02, EE 01.03.03]. The survey questions focus on the ELOs, as well as other relevant issues of the program curriculum.

Since 2016, the prospective employers' surveys are carried out regularly by HUST. In addition to the online questionnaire issued by the University, SEE also carried out its own survey, either in the online form or via direct communication with industry partners. The school also take feedback from the Departments, lecturers and students [EE 01.03.04].

In June 2013, SEE collaborated with HUST to organize a workshop which gathered industry partners' feedback on the new program curriculum. In preparation for the new, revised CDIO-

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[1] http://www.cdio.org/

based program, SEE organized another workshop in May 2017, which attracted attention from several industry partners [EE 01.03.05, EE 01.03.06].

The School's Board of Director also regularly coordinated with the School departments to organize meetings and facilitate discussion between industry partners, the lecturers and the students [EE 01.03.07]. Thanks to all the effort of SEE, the portion of graduates from the program of EE who receive job offers after 6 months from graduation is very high. A recent survey, done by SEE, revealed that the percentage of students having a job which closely related to the program is very high (Figure 1-1).
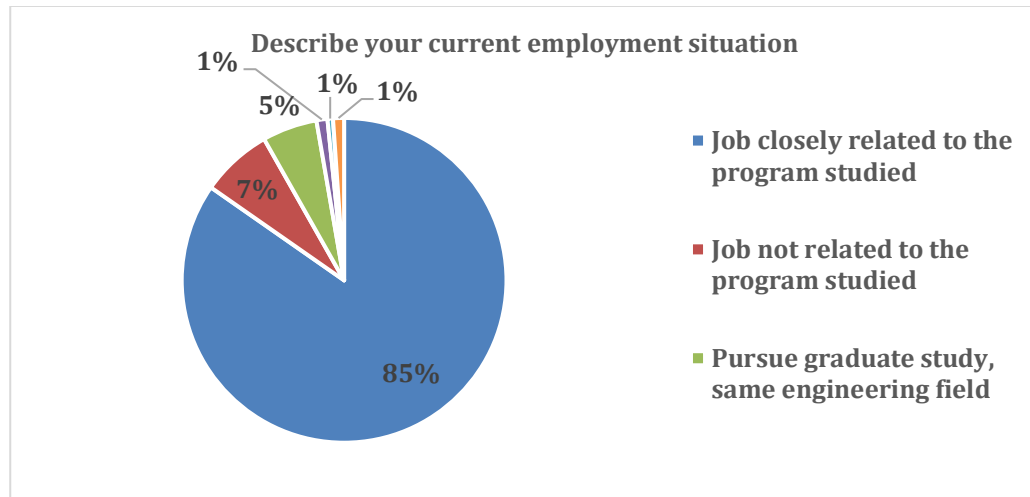
Figure 1-1 Extracted survey results (2019).

Criterion 2   Program Specification

2.1   Information in the programme specification is comprehensive and up-to-date

Upon admission, a description of the electrical engineering curriculum is given to students as well as informing the stakeholders on the website of the school of Electrical Engineering (white book) [EE 02.01.01]. The information provided in the description of the training program include [EE 02.01.02]:

1. Program Objectives
2. Learning outcomes - Expected Results
3. Training time and knowledge attained from the whole course
4. Expected target student
5. The training process and graduation conditions
6. Score scale
7. Program content
8. Brief description of the course content

From the 2017-2018 academic year, Hanoi University of Science and Technology and other units began to implement the training program by CDIO method. The new training program is applied for students from the 62nd promotion[2].

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[2] HUST use the letter "K" to denote promotion; thus the 62nd promotion can be referred to as K62

An important basis for evaluating and updating training programs is based on international universities' curriculum. For Power Systems major, in particular, some important references may be mentioned: The training program in Electrical Engineering of Tsinghua University (China) [EE 02.01.03], the survey on training programs in Electricity Sector (Power Engineering) of the US and Canada [EE 02.01.04]. Information on the worldwide programs in Electrical engineering is gathered, reported for reference during the establishment of the program curriculum [EE 02.01.05]. A common trend that has been recognized is that "today's power engineering profession requires a more diverse skill set and broader knowledge than in the past"[3].

2.2   Detailed, complete and up-to-date syllabus

The training program is divided into five blocks of knowledge group, including general education, basic knowledge base, technical internship, specialized electives, electives, course projects, and graduation projects. The total credits of the Electrical Engineering training program are 160 credits. All have covered general requirements and specific requirements that students need to achieve upon completion of the curriculum (Table 2-1).

Table 2-1 . Knowledge blocks in the electrical engineering training program.

Block	Knowledge group	Credits	Ratio
I	General knowledge	44	26,3%
II	Basic knowledge base and core	46	36%
III	Technical internship	2	1,3%
IV	Elective subjects	8	5,0%
V	Specialized courses	44	27,5%
	Total	160 credits	

All detailed outline of the modules in the training program are presented in Vietnamese and English uniformly and include the following items [EE 02.02.01]:

- Name of the course
- Code
- Duration: required duration for theory part, exercise, lab work, and self-study
- Targeted participants
- Prerequisites: Listing the previous, prerequisite, and parallel courses
- Course objectives and outcomes, contributions to the learning outcomes
- Course content outlines
- Learning materials: listing textbooks and references

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[3] D. Ray, N. Ray Chaudhuri and S. Brahma, "Trends in Electric Power Engineering Education: An Analysis of Future Challenges," in *IEEE Power and Energy Magazine*, vol. 16, no. 5, pp. 32-41, Sept.-Oct. 2018

- Learning methods and students tasks: guiding students on how to study and how to achieve the best results
- Evaluation of results: determining the weights for scoring the learning process and the final assessment
- Learning content and teaching plan

Before each semester, all teaching groups will meet, discuss and agree on the content of lectures, methods of evaluation. Student learning outcomes, teaching and assessment methods are discussed updated if necessary [EE 02.02.02].

Besides, the details of some modules can be updated based on feedback from class managers, online survey forms [EE 02.02.03]. The curriculum is updated annually, based on the university's curriculum revision process [EE 02.02.04]. All updates in the framework have to be first drafted by the Department and lecturers being assigned, then approved by the School's Board and submitted to the University.

Table 2-2 Training program adjustments for the period 2013-2018.

Time	Changes applied	Effective from Promotion
2011	Change from control theory experiment into homework	From 55th promotion
2012	Separation of Module EE3240 Power supply system into Module Power supply system EE3245 and Module EE3142	From 56th promotion
2012	Supplementing the General Law module	From 57th promotion
2015	Addition of the subject "Mechanical Design of Overhead transmission lines"	from 57th promotion

2.3 The description of the curriculum and the outline of the modules are publicly available and accessible to all stakeholders

After the program curriculum has been finalized, the education program is disseminated in writing to all relevant lecturers and staff for implementation during the training process. Every year SEE coordinates with the Office of Student Admission to publish updated information regarding the training programs and quota [EE 02.03.01].

The content of the training program is also informed through the system of text documents provided by the Hanoi University of Technology to students when entering the school [EE 02.03.02]. The main contents of the curriculum including the curriculum description and the summary of the module are also provided on the website of the Departments, on the website of the School of Electrical Engineering for students. Students can look up training programs, subjects in the program, their own scores through the web portal as well as through the student registration portal [EE 02.03.03, EE 02.03.04].

Besides, during each semester, the school and the departments maintain different communication channels to advise, consult and answer students' questions about the program, contents of modules, career orientation [EE 02.03.05]. The main information channels used to communicate with students about the training program, answering questions are:

- Email of Academic advisor of the School [EE 02.03.06]: cvht.see@hust.edu.vn
- Official Facebook fan page: https://www.facebook.com/viendien.bk/
- Official Facebook fan page of the Department of Electric power systems
  https://www.facebook.com/hethongdien1957/

Criterion 3   Program structure and content

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

The Program Curriculum Development Committee of the School of Electrical Engineering has developed the program following the process of developing the CDIO standard curriculum. The program consists of knowledge blocks: General education; Fundamental knowledge and skills; Specialized knowledge, optional modules (optional elective, free elective), technical internship skills, course projects, and graduation projects. The contribution of knowledge blocks to the program ELOs are shown in Table 3-1 [EE 03.01.01].

- General education includes mathematics, physics, basic informatics, and basic administrative management. It also provides students with basic philosophical knowledge as the foundation of reasoning and problem-solving.
- Fundamental knowledge block has two subsets of subjects. One is a basic knowledge module for engineers in the field of electrical engineering (engineering mechanics, statistics & probability, supporting tools such as technical drawing). The second one is the core knowledge module which serves as a gateway to the power engineering field. This block introduces fundamental concepts of the circuit theory, the electric materials, power supply system, the software and tools in electrical engineering.
- The specialized knowledge block is based on the compulsory courses, selected according to the specific orientation of the students or further research plan of the students (24 credits). The program of electrical engineering offers two majors: Electrical-Electronic Equipment and Power System.

Each module includes the following parts: theory conducted in class, exercises, lab work, and self-study. This work-load is specified in the detailed course syllabus. There are lab works in most of the core modules [EE 03.01.02].

Soft skills are designed and introduced to students in the course "Introduction to electrical engineering" with practical activities on presentation skills and report writing [EE 03.01.03]. Students will continue to improve their skills in the project-oriented courses 1, 2, and 3 and their graduation thesis.

As shown in the ELOs (Table 1-2), there is an emphasis on the ability to do modeling and simulation. To reach this target, several courses require the student to use various modeling software for doing homework, and project. In the Power System Experiment II (EE4041), students are not only required to read and understand the operating manual of experimental devices (protective relays) but also required to use dedicated software to connect with the

devices, retrieve and analysis results. In Project III course (EE4060), students are required to use dedicated software to do short-circuit analysis and protective relays coordination[4].

In the course Project II, students are required to develop a design of electric machines, or a small-scale transmission system, in which students can understand the compromise between the technical and economic aspects of the solution. In the 4th and 5th year, the students' knowledge of these aspects is enhanced with courses which introduce more advanced concepts in engineering economics (EM 3661 - Engineering Economics) and engineering reliability (EE4114 – Power system planning). It can be seen that these courses are aligned to achieve ELO 2 and especially ELO 4.

Table 3-1 . Knowledge blocks in Electrical Engineering Program Contribution to Outcomes.

	Training program section	Credits	Contribution to Outcomes																			Ratio
			1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5	2.6	3.1	3.2	3.3	4.1	4.2	4.3	4.4	4.5	5.1	5.2	
I	**General education**	**44TC**	**X**																			
1.1	Math and basic science	32	X																			20,0%
1.2	Political theory	10																		X	X	6,3%
1.3	Physical training	(5)																		X	X	
1.4	Knowledge of National Defense and Security	(10)																		X	X	
1.5	English	6												X								
II	**Core knowledge**	**46**		**X**	**X**										**X**	**X**	**X**	**X**	**X**			**36%**
III	**Technical internship**	**2**																				**1,3%**
IV	**Elective subjects**	**8**																				**5,0%**
V	**Specialized knowledge**	**43**				**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**		**X**	**X**	**X**	**X**	**X**			**27,5%**
5.1	Bachelor's degree major	20				X	X	X	X	X	X	X	X									
5.2	Additional subjects specialized in Engineering	15				X	X	X	X	X	X	X	X		X	X	X	X	X			
5.3	Optional self-selection	8																				

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[4] SEE and its Department spend much effort to collaborate with software vendors, so that SEE's students have access to state-of-the art modeling software in power engineering, see also section 9.3 and 10.5

5.4	Pre-graduation internship	3	x	1,9%
5.5	Capstone project and graduation thesis	9	x	5,6%
	Total	**160**		

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

As aforementioned, the knowledge blocks and modules in the curriculum are designed so that all learning outcomes are covered. In each syllabus, each module defines the level of response of the module to the learning outcomes with the levels of Introduce (GT), Teach, Test (KT) and Utilize (SD).

A detailed outline of each subject is also established, taking into consideration the established learning outcomes [EE 03.02.01]. In the detailed outline of each subject, it is mapped to the output standard, as illustrated in Figure 3-1.

Tiêu chí	1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5	2.6	3.1	3.2	3.3	4.1	4.2	4.3	4.4	4.5
Mức độ	SD	GD	GD	SD	GD	GT	SD	SD	GD	SD	SD	GT	GT	GD	GD	GD	GD

Figure 3-1 Mapping from learning outcomes to detail subject.

In the document describing the program curriculum, the standard study plans for each program and major is presented [EE 03.02.02]. This standard program serves as a guideline for students to plan their study and understand the logical connection between the courses.

As mentioned in section 1.3, SEE is reviewing its program curriculum, and develop revised programs in Electrical Engineering [EE 03.02.03, EE 03.02.04]. Several changes to the learning outcomes have been proposed. Specifically, English and technical writing have been recognized as essential skills that graduates from SEE need to improve (see also section 11.2). Accordingly, in the new program curriculum, a new course "Technical writing and presentation" (in English) has been introduced.

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

The structure of the training program ensures the continuity and reasonable ratio of knowledge blocks for both bachelors and electrical engineering engineers. (Figure 3-2). The ratio between compulsory and elective knowledge blocks is decided, to make the training program flexible and meet the different requirements of learners.
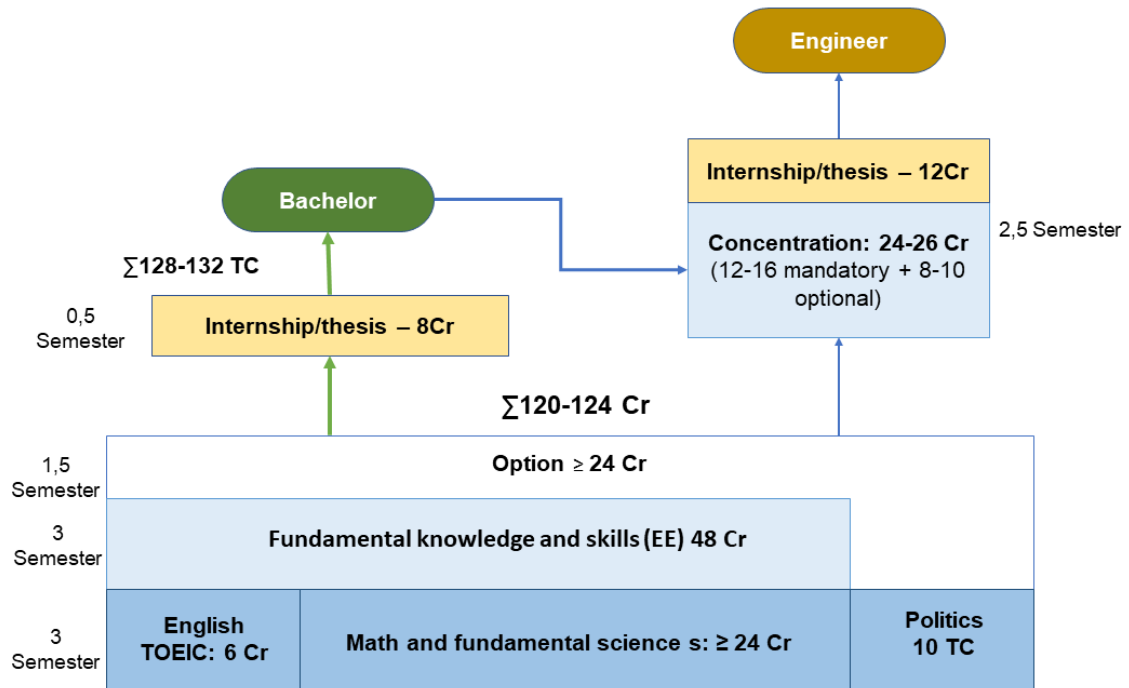
Figure 3-2 Structure of the program of Electrical Engineering Engineer.

Of the total of 20 basic and core modules, there is one practice module, two project modules and 17 theoretical modules of which 16 modules have experimental credits, 1 module has project assignments. Thus, it can be said that the practice activities and project assignments account for a large proportion of the program. Table 3-2 shows a summary of the contribution of theoretical study, exercises and practice experiments of the EE program curriculum. Each student must finish the General Education block, Fundamental knowledge and skills block, then has the choice of two majors: Power systems or Electrical and Electronic Equipment. In each major, there are also mandatory courses and elective courses [EE 03.03.01].

Table 3-2 . Proportion of theory, exercises, and practice - Electrical engineering program.

Knowledge block	Lecture (%)	Exercises (%)	Practical training (%)
General Education	46.2	37.4	16.5
Fundamental knowledge and skills (in EE)	59.4	20.3	20.3
Concentration courses (Power systems / Electrical and Electronic equipment)	47.9	11.7	40.4

The standard study plan is shown in Figure 3-3 and Figure 3-4. This study plan serves as a suggestion for students in registering classes. It also explains the structure of the program, pre-requisite courses. On the other hand, as described in Section 2.1, in the process of developing the learning outcomes, the curriculum design team always refers to the

international program curriculum. This benchmark ensures that the program content is always up-to-date, and will help facilitate student exchange. Besides, the graduates from the EE program will be more readily accepted if they choose to study abroad after finishing their undergraduate study at HUST.

The Electrical Engineering training program, as well as other training programs of the School, are regularly updated. From 2017 to the present, the School of Electrical Engineering is actively building an improved training program for several disciplines, including Electrical Engineering [EE 03.03.02]. In the revised program, the students in EE will have more choices, as the elective courses are divided into 03 modules [EE 03.03.03].

- Power Engineering
- Electrical and Electronic Equipment
- Industrial and Commercial Power systems

The curriculum design committee also identified the need for a module regarding renewable energy. Therefore, the course "Renewable Energy" has been introduced since the 3rd year in the revised program [EE 03.03.04].

Electrical Engineering Program – Power Engineering Major

Standard study plan (effective since 2009)
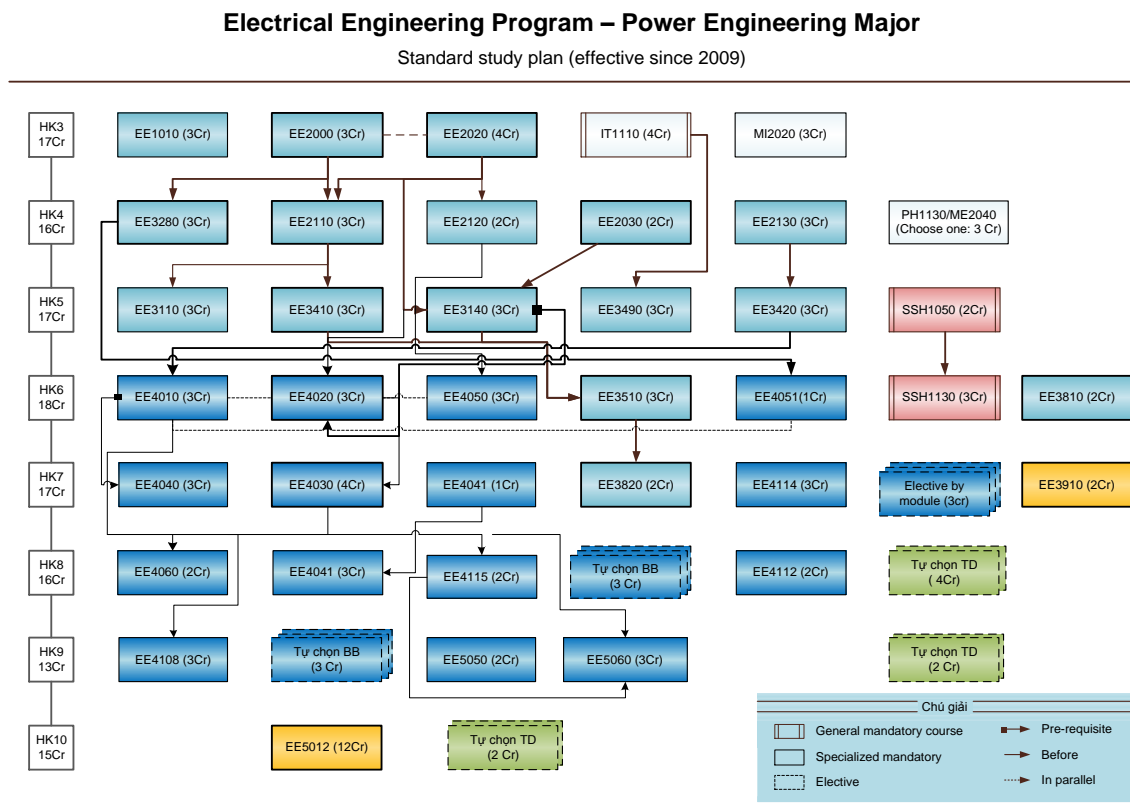
Figure 3-3 Study plan for the Electrical Engineering program, Major in Power Engineering.
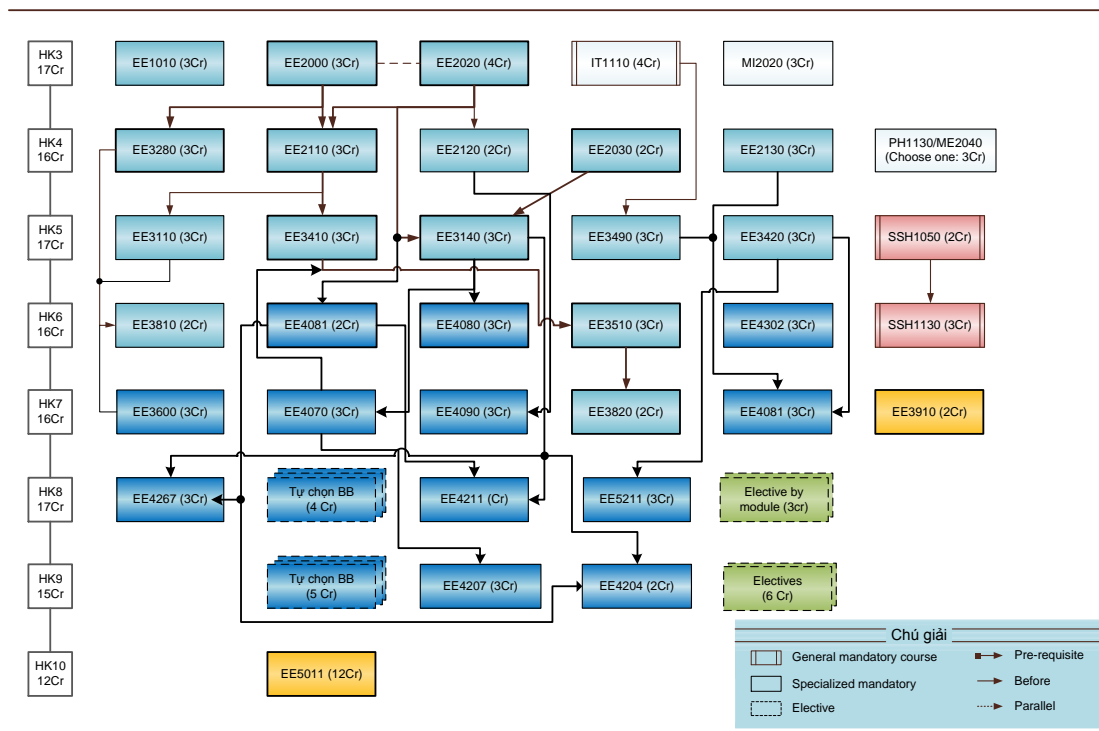
Figure 3-4 Study plan for the Electrical Engineering program, Major in Electrical and Electronic Equipment.

Criterion 4 Teaching and learning approach

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

The training philosophy of the School is "*learning in parallel with practice*." This philosophy is disseminated to all the stakeholders such as lecturers, students, students to be enrolled and companies through websites [EE 04.01.01], presentations of the School [EE 04.01.02], or students' meetings [EE 04.01.03].

SEE students are strongly encouraged to take part in research groups led by the academic staffs. The research work consitutes an important practice activity. The students who take part in research labs usually have higher chance of employability. Many of EE students taking part in research labs get job offers before their graduation.

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

Teaching and learning activities, as well as teaching schedules, are detailed in the syllabus of each module. Students are instructed on how to study effectively, use references for each chapter; the learning contents are defined in the detailed syllabus. Besides, the types of assessment are also specified to ensures that the module meets its learning outcomes.

The teaching methodology consists of the presentation of theory, interpretation, group discussion, practice [EE 04.02.01] or assignments. There are several methods for assessment of learners [EE 04.02.02].

For the module of "Introduction to electrical engineering" (EE1024), active learning methods are applied. Students are grouped to perform a simple, weekly, classroom-based assignment, students are encouraged to report on homework and project progress to improve their writing skills and presentation skills. Students are also grouped in hands-on practice workshops so that they can learn safety rules, familiarize themselves with basic electrical components [EE 04.02.03].

For the modules having lab-work, after each theoretical part, students will work in a laboratory. There are a maximum of 20 students per class to ensure the best performance. Before doing lab-work, students must review the theory and prepare for the experimental session by reading the experimental guide first. After the session, students must submit a lab-work report [EE 04.02.04].

For the courses with theory and exercises only, the contents taught in class are basic knowledge of the subject, but through reports and homework, students are required to self-equipped with broader and more in-depth knowledge. In several courses, lectures and further-reading materials are uploaded on the courses web page so that student can gain an overview of the courses, and begin choosing a topic for their essays/assignment [EE 04.02.05]. Course materials can also be exchanged between lecturers and students through different channels such as Facebook or Office 365 groups.

In the student meeting of each semester, the School also invites industrial companies to introduce their activities, job requirements, and job opportunities to give students a more realistic view of the profession, and to help students with a better understanding of potential career and for them to set up a goal. Internship activities or the meetings with industrial companies specifically meet the learning outcomes 4.1 and 4.2 [EE 04.02.06]. Prior to the preparation of the undergraduate thesis, students have a six-week internship in a company to get acquainted with a specific job and identify the problems to solve during the internship, then there may be an idea for the capstone project [EE 04.02.07]. The school constantly make efforts to expand the collaboration network, such that the students have several choices of companies where they can do their internship [EE 04.02.08].

For the projects like Project 1, 2, 3 or Capstone project, each instructor is assigned to supervise several groups of students, each group of 3-5 students. The module "Project 1" aims to equip students with the skills needed to develop a product that requires knowledge of electronic circuits and microprocessors to design simple measuring or control devices, as well as teamwork skills and other soft skills [EE 04.02.09]. The module "Project 2" allows students to practice the design of power-electronic systems or electrical networks. In particular, for Project 2, students are supervised by a lecturer and a practical instructor at a practical training center. Students can come to the practical training center at an appropriate time for the design and hardware implementation process [EE 04.02.10]. Fourth-year students begin to receive in-depth research topics from the research labs to complete Project 3. This project resembles a mini-thesis where the student is given an assignment which resembles a realistic design job in the industry [EE 04.02.11].

4.3   Teaching and learning activities enhance life-long learning.

Lifelong learning is a valuable learning outcome for higher education. For the Electrical Engineering program, this requirement is specified in the learning outcome 2.6. The curriculum is designed to ensure that students have a solid foundation in mathematics and

science, solid core knowledge so that they can learn further on their own. Most fundamental and core subjects have experiments after each block of theoretical knowledge.

For theoretical modules, lecturers focus on evoking knowledge, assigning homework to students. This activity helps students have habits and skills of self-study and seeking for information. Students learn actively in the classroom through a series of exercises, carefully prepared questions with a variety of learning styles, such as doing a project, group assignments, seminars, and good points are awarded to excellent students. The application of the bonus points is used in the group of lecturers in charge of the subject and is announced to students during the first week of the course. This scheme is also shown to students through the distribution of workload in a module.

One another critical factor for improving the academic quality, to meet the learning outcomes is that students are encouraged to conduct their own research with lecturers in research labs or R&D centers. Each lab is supervised by one or a group of lecturers, focusing on some research tracks. Students are distributed into working groups with specific tasks contributing to the Lab's research works. Each year, a Week of students' research is organized by the University so that students have a chance to present and compete their works [EE 04.03.01, EE 04.03.02]. The number of participating students from the School over the past 5 years is shown in Table 4-1.

Table 4-1. Students in EE taking part in scientific research [EE 04.03.03]

Academic year	Number of Participants	Number of projects
2011-2012	11	6
2012-2013	1	1
2013-2014	3	3
2014 – 2015	10	5
2015 – 2016	4	2
2016 - 2017	6	3
2017-2018	25	10

Many students join research labs since their 2nd year or 3rd year of study. The lab activities contribute a great deal to the research and teaching activity. Senior year students help freshman with orientation, courses materials, and so on. Students also assist lecturers and professors in their research. Several SEE research papers are co-authored with undergraduate students, including international conferences and ISI papers [EE 04.03.04].

After finishing the undergraduate degree, many students still find the need to pursue further study. One main reason is that the power engineering field is becoming very complicated and contain multi-disciplinary aspects. Thus, depending on the nature of the workplace, students may need to study further, either to gain knowledge of in-depth and advanced topics in electrical power engineering (reliability analysis, integration aspects of renewable energy) or to expand their knowledge base (engineering economics, business administration) [EE 04.03.05].

Criterion 5   Student assessment

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

The student assessment is conducted from the student's enrollment until the, and is aligned to the achievement of the expected learning outcomes

Student assessment at enrolment

The student assessment at enrolment has a crucial role in the success of a training program, ensuring the student's capability to fulfill the program's learning outcomes. For a student being able to study "Electrical Engineering," students must successfully pass the national high school graduation exam, organized by MOET[5]. The candidates to the SEE training programs are selected based on their "Block A" marks (Math, Physics, Chemistry), or "Block A1" (Math, Physics, English) [EE 05.01.01]. Thus, since the entrance, the selection criteria have been aligned with the ELOs shown in Table 1-2[6]. Since 2017, the EE program has been using a new entrance code (EE1), with the entrance quota clearly defined and announced (see also section 8.1).

Currently, HUST is among Vietnam's leading technical universities, with very high entrance mark for several programs, including Electrical Engineering [EE 05.01.02].

Table 5-1. Comparative benchmarking of some universities

Year	Program	HUST	Electric power University (EPU)[7]	Thai Nguyen University of Technology[8]
2017	EE2	27.25	19.5	15
	EE1		19	15.5
	EE-E8	26.25		15.5
2016	EE2	8.53 (Math 8.5)	20.25	16
	EE1		17.75	15 - 16
	EE-E8	7.55 (Math 7.5)		16
2015	EE2	8.5	20.75	16
	EE1		21.25	16
	EE-E8			
2014	EE2	A1: 23 and A: 23.5	18	14
	EE1		18 - 20	15
	EE-E8			14
2013	EE2	24.5	A: 19.5 and A1: 19	14
	EE1		20.5 - 21	14
	EE-E8			

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[5] One unique set of exam questions is used for each subject in all high school in Vietnam.

[6] ELO 1.1

[7] www.epu.edu.vn

[8] http://en.tnut.edu.vn/

Assessing students during the learning process

To ensure the expected learning outcomes of each course are met, the student assessment is carried out throughout the learning process as well as the final academic results. In each semester, a student registers from 12-24 credits for a regular, 8 credits for the summer semester. Both formative assessment and summative assessment can be based on written exam or oral exam [EE 05.01.03].

The final assessment mark of each course is decided based on these two components, following the university regulation [EE 05.01.04].

- Formative assessment mark (weighted 0.2-0.5) (considering midterm exams, exercises, lab works, class attendance)

- Summative assessment mark (weighted 0.5-0.8)

Module score on the scale of 10 (varied with a step of 0.1), then converted to a scale of 4 (A, B, C, D, F). Module score from 4 (D) is considered "pass". If students fail, they must retake the course or chose an alternative course. Students can retake the course to improve the score.

A student's academic progress is evaluated based on the number of credits accumulated, the semester average score (of all the modules taken in the curriculum during the semester), cumulative GPA (weighted average score considering the last score of modules in the curriculum). HUST also use a grading system to classify students' accumulated credit in terms of "student year". Third-year students must accumulate a credit number 64-96, 96-128 credits for fourth-year students and more than 128 for fifth-year students (see also the statistic in Figure 8-1).

Evaluation of students for graduation

The student evaluation for graduation based on the assessment of all courses and especially through the graduation project.

- To graduate. students must fulfill the requirements for graduation: the final cumulative GPA should be greater than 2.0 upwards, having completed all required modules of the curriculum, not lacking more than 8 credits as specified in the Training Regulation, evaluation for graduation as specified in the University regulation.

- Graduation thesis takes 12 credits at the end of the program. Each student must be able to apply synthetic knowledge and skills accumulated during the whole program to study and solve a problem of theory or application in the area of electrical engineering.

- The results of the capstone project of each student must be reported in a thesis in the format specified by the School of Electrical Engineering. Each student must defend the thesis before a Graduation Thesis Jury Board of 3 to 5 members[9]. Thesis evaluation is public with clear criteria. SEE also standardized documents related to the graduate thesis defense, which are being used by all departments [EE 05.01.05].

The final thesis preparation consists of 15 weeks of work under the supervision of an instructor. During this period, the student should prepare a thesis in an electronic and a hard copy [EE

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[9] HUST regulation, article 28 [EE 05.01.04]

05.01.06]. He/she will also need to prepare presentation materials, to defend his/her thesis in front of a jury. Therefore, for the graduation thesis, students must prove their ability to utilize knowledge in a new engineering problem, consisting of problem statement, methods, and results. The students also need to prove their presentation skills, including the preparation of PowerPoint slides, and the presentation.

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

The student evaluation methods, from the entrance exam, evaluation for major registration, module examination (formative/summative assessment), until graduation thesis, are clearly defined in the University regulations [EE 05.02.01]. These regulations are publicly informed to stakeholders: teachers, students, support staffs, through channels such as enrollment website, the Academic Office website, "open day" program, job fairs, student meeting week, meetings with class supervisors, advisors [EE 05.02.02].

The academic office also has one website which publishes the academic calendar, notification of course registration timeline, exam calendar, etc [EE 05.02.03]. To accelerate the response time to students' questions, the Academic office also has a Facebook fan page [EE 05.02.04]. Besides, the SEE advisory board also communicates with students on other issues related to the course registration (see section 8.3).

In all modules (mandatory and elective) students are evaluated with two components [EE 05.02.05]: formative assessment and summative assessment. For each module, teachers will inform students in the first week of the semester with the following information: the content and requirements of the course, the way examinations are conducted, assignments, references [EE 05.02.05]. The way progress score and module score are calculated is clearly specified in criterion 5.1. To evaluate correctly and fairly, each lecturer must prepare an exam solution with scoring guide.

With project-based courses, students are required to work in teams, meet teachers regularly (1 time/week), write reports and prepare slides to present before a jury board (of 3-5 members) at the end of the course. To evaluate students, teachers give progress score to each student considering his/her hard-working, achievements, teamworking, presentation and answers to questions.

The assessment of the graduation thesis consists of 3 components:

- Summative mark, given by the supervisors (weight of 1)
- Thesis review, comments, questions and mark given by a reviewer (weight of 1)
- Thesis defense mark, which is calculated based on the average scores of all jury members (weight of 2)

After the lecturer finished uploading the formative/summative assessment scores online, his/her students will receive the scores through the student web service, which shows clearly the score of each component (formative/summative) [EE 05.02.06].

A student's academic result is evaluated in the entire process of learning through each module in various aspects, combining different methods and criteria. Proof of a student's academic result is the academic transcript K54-K57 [EE 05.02.07]. The score of each learning module is digitalized in the system and accessible in each student's account.

5.3   Study assessment methods are variety, ensure validity, reliability and fairness

The study assessment is conducted with various methods to align with each course's learning outcomes.

The assessment procedures and methods should follow the MOET and HUST regulations, which are communicated to students [EE 05.03.01, EE 05.03.02]. In each course syllabus, the method of evaluation and weights of each component (formative and summative assessment) are also clearly defined [EE 05.03.03, EE 05.03.04].

To ensure the reliability and fairness of the assessment, the current regulation on the assessment of students requires that the lecturer prepare the final exam questions along with the solutions. Besides, the solutions must include the scores given to each question/sub-question [EE 05.03.05]. If there is an appeal for re-examination, another lecturer will be assigned to evaluate the student's answer sheet.

Every semester, the Academic office perform a survey about student satisfaction level regarding the courses of all programs, including those of SEE [EE 05.03.06]. SEE also carries out online surveys [EE 05.03.07]. Results of the surveys on learning and assessment show that most students are highly satisfied with the transparency, fairness, and accuracy of the assessment.
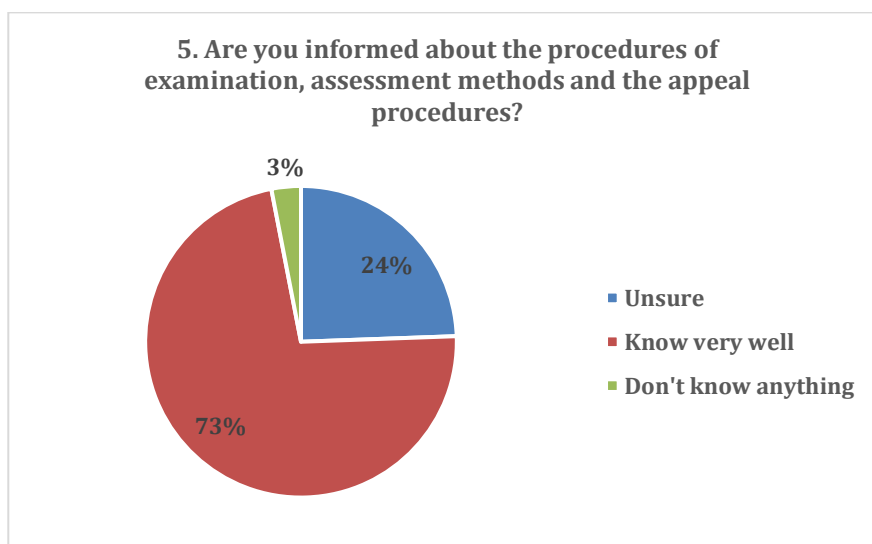
Figure 5-1 Extract from the result of the students' surveys on students' satisfaction on learning and assessment process [2019].

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

All regulations related to examination/evaluation are specified in the University's training regulations. Examination rooms should ensure the necessary number and density of students; this is done by the Office of academic affairs. There is at least one proctor for every 60 students. Students are provided with enough information to understand the University's training regulations right from the enrolment day and during all the training process until graduation day.

Students are informed about the regulations on complaining the examination results: request form to review the score should be submitted to the department in charge and the School, scorer will review the student's answer sheet, score it again and write a formal report to the School and the Office of academic affairs to inform the student finally.

- Exercise sessions are designed to help students recognize the misunderstandings and have appropriate adjustments to have a better learning method.
- The mid-term exam results should be sent to students before the end of the module and appropriate explanations should be done to help students correct all the errors and misunderstandings.
- The final exam score should be announced to students no later than 15 days after the examination day [EE 05.04.01].
- After each semester, students should know about their GPA and CPA after having the scores of all modules registered for that semester [EE 05.04.02].
- For each semester, the School organizes sessions of "Student meeting" for students to share experiences and have feedback to the School. Moreover, students also have online social networks for this purpose.
- After each semester, students are surveyed on each course they have just taken [EE 05.04.03].

Before the academic year of 2018-2019, lecturers had to send the score sheets to the School's office staffs, who then entered the students' scores into the University's software called SmartUni (Figure 5-2). Since the number of classes is significant (around 700 classes for Semester 1 and 900 classes for Semester 2), the score entering process takes significant time. Since the school year of 2018-2019, this process has been authorized to lecturers based on a new academic management system so that students can access their scores quickly [EE 05.04.04].
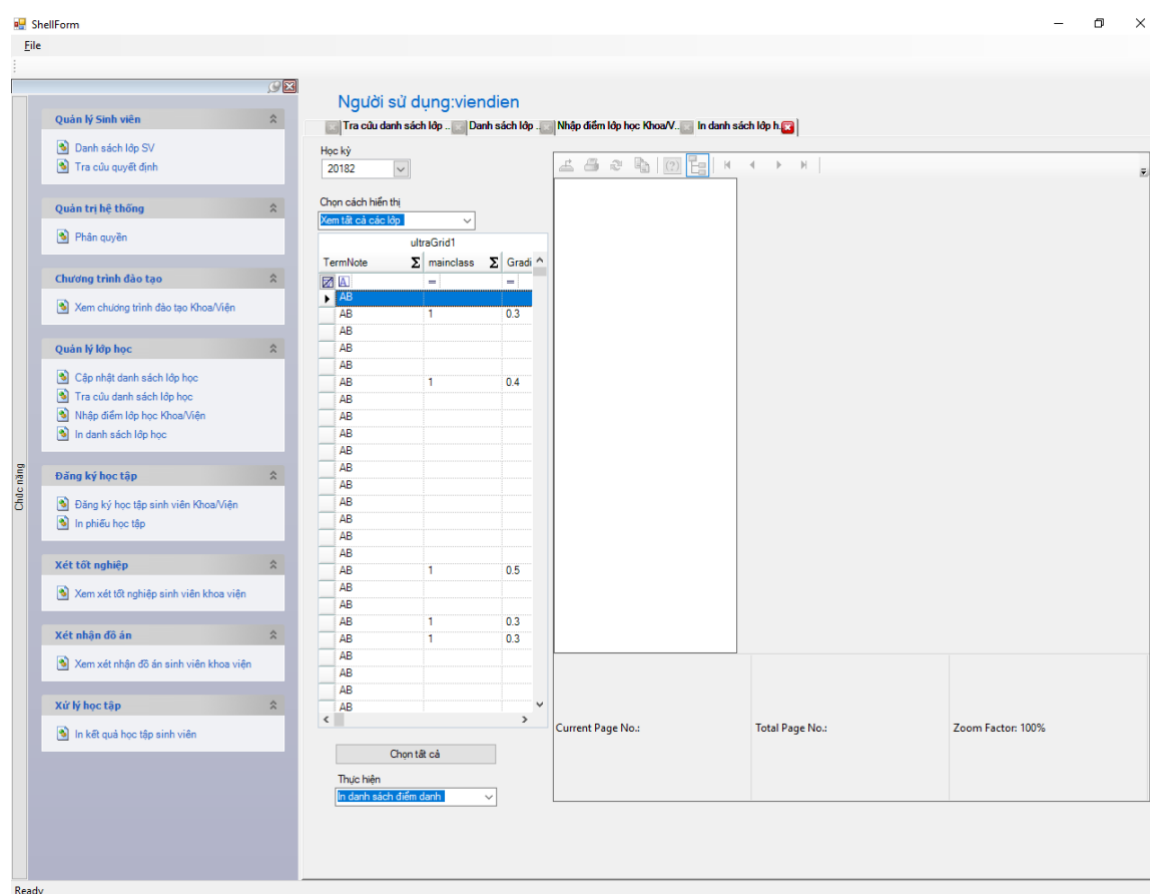
Figure 5-2 User interface of the new score management system (SmartUni).
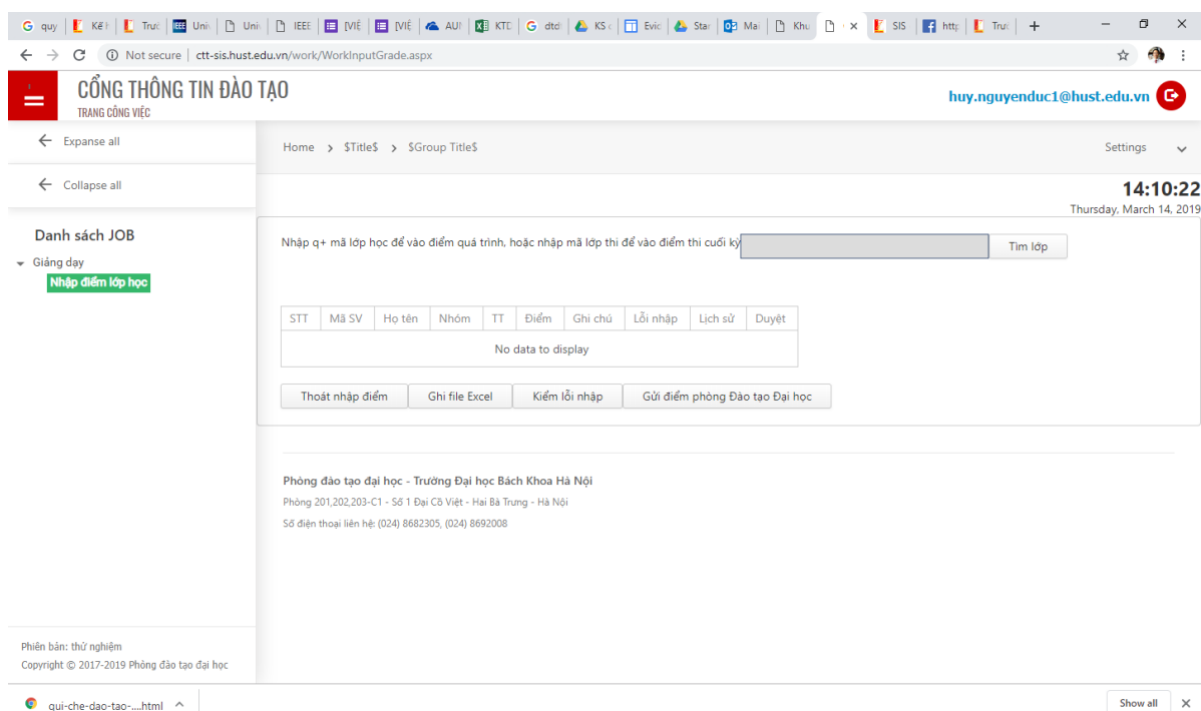
Figure 5-3 User interface for a lecturer.

5.5 Student have ready access to the appeal procedure

Complaint procedures on academic results are defined explicitly and clearly in Article 10 "Reviews and complaints on academic results" in the academic regulations of the University [EE 05.05.01], which are disseminated to the student through various channels. According to the regulations, if students have questions on the score of a module, first, they should contact the instructor in charge for an explanation. If the student is not satisfied with the instructor's response, he/she can submit a Review Request to the School within one week since the announcement of the exam results. To make a Review Request, students should go to the School office to fill out a Request form [EE 05.05.02]. The review will be carried out, and results will be announced no later than 1 week after the form submission. SEE's recent surveys show that the majority of students are satisfied with the regulations on examinations and student evaluations [EE 05.05.03] (Figure 5-4).
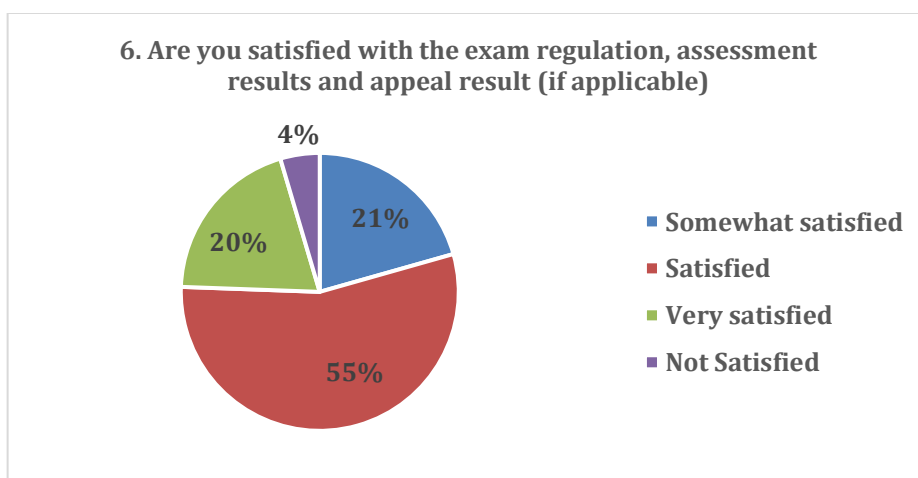

Figure 5-4 Extract from the result of the students' surveys on students' satisfaction on learning and assessment process [2019].

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Criterion 6   Academic staff quality

6.1   Planning of academic staff establishment or needs (including succession, promotion, re-deployment, termination, and retirement plans) are carried out to ensure that the quality and quantity of academic staff fulfill the needs for education, research and service.

Planning of academic staffs

At the beginning of each management term, SEE and the belonging departments set up a working plan, which includes human resources management. Based on the workload of the School as well as the development plan in the near future, the Board of Director can set up the personnel work plan table, the total number of staffs, the percentage of staff with Professor, Associate professor, Ph.D. titles, the number of retired staffs.

Table 6-1 and   Table 6-2 shows the planning data for the 2013-2018 term and the actual implementation results [EE 06.01.01]. With the current staff, SEE always ensures enough lecturers to teach core and specialized subjects. In addition, SEE invited some foreign researchers to teach intensive or advanced courses [EE 06.01.02].

Teaching assignment is carried out at the beginning of each academic year, on the basis of the number of teaching staffs and the expected teaching load. Teaching assignments are done by each Department, and information is sent to School [EE 06.01.03]. Each faculty member has the right to register subjects that he or she wishes to teach. Based on this list and discussion of the teaching groups, SEE will assign teaching in accordance with the capacity and balance the teaching load for lecturers.

Based on the annual teaching load, the number of teaching staffs soon reaching retirement age [EE 06.01.04], SEE and its departments coordinate to ensure the human resource meet the workload demand. Some lecturers with high academic profiles have been employed recently [EE 06.01.05]. New recruits are encouraged to pursue scientific research and improve their academic profile, as they have a higher priority in receiving the University research grant [EE 06.01.06, EE 06.01.07].

Table 6-1.Academic staff planning during 2013-2018 at School of Electrical Engineering.

Year	2013	2014	2015	2016	2017	2018
Total number of staffs	144	140	144	139	135	131
Number of lecturers	118	117	114	111	107	105
Number of support staff[10]	22	19	25	23	23	19
Number of administrative staffs	4	4	5	5	5	6
Ratio of Full Professors/lecturers	2 (1,7%)	2 (1,7%)	2 (1,7%)	2(1,8 %)	2 (1,9%)	2 (1,9%)
Ratio of Associate professors/lecturers	8 (6,8%)	9 (7.7%)	12 (10,5%)	13 (11,7%)	13(12,1 %)	13(12,4 %)
Ratio of lecturers with doctorate degree (including professors)	54 (45,8%)	56 (47,9%)	56 (49,1%)	71 (64%)	70 (65,4%)	70 (66,7%)
Ratio of support staff with master degree or higher	17 (67%)	17 (70 %)	19 (82,6%)	20 (87%)	20 (87%)	
Number of faculty reaching retirement age/ number of support staff reaching retirement age[11]	0/0	0/0	0/0	4	7	5

Table 6-2. SEE lecturers employed since 2013.

Year	Planned recruitment	Actual recruitment	Lecturer names / country of PhD degree
2012	2	5	• Dr. Nguyễn Hoàng Nam (France) – Dept. of Industrial Instrumentation and Informatics. • Lê Thị Minh Châu (France) – Dept. of Power systems • Lê Đức Tùng (France) – Dept. of Power systems • Nguyễn Thị Huế - Dept. of Industrial Instrumentation and Informatics • Đặng Văn Mỹ - Dept. of Automatic Control

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[10] Supporting staff are responsible for laboratory hours

[11] According to the law, the retirement age for men and women is 55 and 60 respectively. The lecturers with a PhD degree retire at 65 for men and 60 for women. Lecturers with the title of Professor have to retire at 67 for men and 62 for women.

2013	5	6	• Dr. Lê Minh Thuỳ (France) - Dept. of Industrial Instrumentation and Informatics • Dr. Đỗ Trọng Hiếu (France) – Dept. of Industrial Automation • Dr. Trần Mạnh Hùng (France) – Dept. of Power systems • Dr. Đặng Quốc Vương (Belgium) – Dept. of Electrical and Electronic equipment • Vũ Thị Thúy Nga – Dept. of Automatic Control • Nguyễn Tùng Lâm - Dept. of Industrial Automation
2014	4	2	• Dr. Nguyễn Hoài Nam (USA) - Dept. of Automatic Control • Dr. Bùi Minh Định (Germany) – Dept. of Electrical and Electronic equipment
2015	1	1	• Dr. Trần Tuấn Vũ (France) - Dept. of Electrical and Electronic equipment
2016	2	0	
2017	2	1	• Dr. Trần Thị Anh Xuân (France) Dept. of Industrial Instrumentation and Informatics
2018	2	2	• Dr. Phạm Văn Trường (Taiwan) Dept. of Automatic Control • TS Nguyễn Đức Tuyên (Japan) – Dept. of Power systems

Quality of human resource

SEE has a very concrete plan to encourage officials to be appointed as Professors and Associate Professors. Currently, many of the professor positions are soon reaching the retirement age [EE 06.01.08]. Therefore, there must be specific plans and targets for professor positions to compensate for retired officials. HUST as well as SEE is one of the leading units in research activities as well as practical applications, so it is one of the tasks to plan new positions of professors.

Table 6-3. Number of professor and associate professor from 2011 to 2017

Year	Number of planned Prof./Associate Prof.	Actual Prof./Associate Prof.	Professor name
2011	0/2	0/1	
2012	0/3	0/2	
2013	1/1	2/3	Prof. Nguyễn Doãn Phước

			Associate Prof. Nguyễn Quốc Cường
			Associate Prof. Nguyễn Phạm Thục Anh
2014	0/2	1/3	Associate Prof. Nguyễn Thị Lan Hương
2015	0/2	2/3	Associate Prof.. Hoàng Sĩ Hồng
			Associate Prof. Nguyễn Hồng Quang
2016	0/5	2/2	Associate Prof. Trần Trọng Minh
			Associate Prof. Nguyễn Quang Địch
2017	0/1	0/1	Associate Prof. Bùi Đăng Thành
2018	0/0	0	

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

Currently, SEE has 135 full-time lecturers including 3 Professors; 13 Associate Professors; 1 Doctor of Science; 69 doctors; 46 Masters. All the academic modules in the program are taught by the faculty members of the SEE. The calculation of the workload of the lecturer is carried out every semester[12].

Table 6-4. SEE teaching staff and students [EE 06.02.01].

School year	Number of teaching staff	Number of students[13]	Teaching staffs / students ratio
2017-2018	135	3545	26.26
2016-2017	139	3686	26.52
2015-2016	140	2970	21.21

The assignment of teaching staff is based on HUST regulations [EE 06.02.02] and staff capacity. The allocation of teaching load also needs to account for the overall workload of the school [EE 06.02.03]. Based on the accurate monitoring of staff's workload data, SEE can adjust teaching workload between lecturers, and determine the need for additional lecturers.

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[12] According to the new HUST regulation, a staff's monthly salary consists of a fixed component, which is based on the Vietnam Labor Code, and a variable component, which is based on the teaching workload and staff's position.

[13] For some programs, SEE share the group of entrance students with other institutions. The student will decide their major after 2-3 years. In the past 2 years, the entrance quota was slightly increased.

Based on the AUN-QA guidelines, the teaching volume calculated according to the FTE index is determined for recent school years [EE 06.02.04]. The statistics of lecturers and workloads are shown in Table 6-5 to Table 6-9[14].

Table 6-5. Statistics of SEE FTEs in 2014-2015.

Category	M	F	Head counts	FTEs	PhD (%)
Professors	1	1	2	1.33	100.00
Associate Professor	6	1	7	4.56	100.00
Lecturers	91	20	111	50.58	53.52
Visiting Prof.	0	0	0	0	N/A

Table 6-6. Statistics of SEE FTEs in 2015-2016.

Category	M	F	Head counts	FTEs	PhD (%)
Professors	1	1	2	0.90	100.00
Associate Professor	6	1	7	2.18	100.00
Lecturers	82	17	99	36.10	55.96
Visiting Prof.	0	0	0	0	N/A

Table 6-7. Statistics of SEE FTEs in 2016-2017.

	M	F	Headcounts	FTEs	PhD (%)
Professors	1	1	2	0.91	100.00
Associate Professor	8	1	9	4.27	100.00
Lecturers	73	19	92	43.74	53.77
Visiting Prof.	2	0	2	0.37	100.00

Table 6-8. Statistics of SEE FTEs in 2017-2018.

Category	M	F	Head counts	FTEs	PhD (%)
Professors	1	1	2	1.02	100.00
Associate Professor	8	1	9	4.35	100.00
Lecturers	74	22	96	45.90	55.85
Visiting Prof.	2	0	2	0.36	100.00

Table 6-9. Statistics of SEE FTEs in 2018-2019.

Category	M	F	Head counts	FTEs	PhD (%)
Professors	1	1	2	0.95	100.00
Associate Professor	6	1	7	2.86	100.00
Lecturers	77	22	99	50.37	50.67
Visiting Prof.	1	0	1	0.570	100.00

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[14] Staff FTE is calculated based on <u>teaching hours only</u>: 1 FTE equals to 40 teaching hours per week. According to the regulation of HUST, each staff's working hours consists of three components: teaching, research, and service, the sum of which should be greater than or equal to 40, but should not exceed 48.

As stated in section 6.1, the number of students entering SEE in the last two years has increased due to an increase in the number of admitted students. This is reflected in the increase in FTEs in the above tables.

The FTEs ratios between staff and students in recent academic years are shown in Table 6-10 below. The results show that the average workload of lecturers of SEE is relatively stable in the last 5 years [EE 06.02.05].

Table 6-10.FTEs staff-to-student ratios during 2014-2019[15].

Academic year	Total FTEs of Academic staffs	Total FTES of students	Staff-to-student ratio
2014-2015	56.46	1817.20	32.19
2015-2016	39.18	1733.95	44.26
2016-2017	49.29	1772.97	35.97
2017-2018	51.64	1781.39	34.50
2018-2019	54.75	1772.41	32.37

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

The recruitment of staffs is implemented in accordance with the recruitment regulations of HUST [EE 06.03.01, EE 06.03.02]. The need for recruitment is identified based on monitoring the teaching load. The job vacancy for lecturer position is publicly informed [EE 06.03.03]. In addition to the main lecturers' positions, SEE can consider recruiting additional teaching assistants. In terms of quantity, in the past 3 years, the number of recruited lecturers is only 20% of the number of retired lecturers.

One difficulty for employing new talented researchers/lecturers in recent years is that the average income of HUST lecturers is not competitive, compared to the emerging universities' offer. Despite this issue, thanks to the reputation of HUST as well as the efforts of the SEE members, SEE is still a place to attract high-quality scientists/researchers/lecturers. Two new lecturers recruited in 2018 are Dr. Pham Van Truong and Dr. Nguyen Duc Tuyen, who are internationally renowned and reputable scientists, with very high numbers of international publications [EE 06.03.04]. These researchers are experts in artificial intelligence and renewable energy, which align well with the objectives of SEE's revised program curricula. Besides, SEE's board of director regularly contact Vietnamese graduate students who are studying abroad (Korea, Japan, America), in order to maintain the connection with potential candidates for Teaching staff in the near future.

6.4 Competences of academic staff are identified and evaluated

The duty of lecturers at SEE is determined and evaluated based on three kinds of activities: teaching, scientific research and other supporting activities such as academic advisor.

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[15] According to the AUN-QA guidelines, 1 FTE student has to take 24 credits per semester.

Assessment of teaching quality of lecturers is carried out in 3 methods:

- Student feedback: The quality assurance office gathers feedback on the class at the end of the semester before the final exam [EE 06.04.01]. The questionnaires take students' feedback and comments on the attitude of teaching, teaching skills, the relevance of course contents. After each semester, the Quality Assurance Office sends students' feedback to the SEE's board of director. Details of the student's feedback system are also described in section 5.4

- Monitoring of classroom activity. The HUST's inspection and legislation office receive teaching assignment from all schools in HUST at the beginning of each semester. Based on the class schedules, the inspection and legislation office's staff regularly check the class attendance. Information about teachers who do not follow the class schedule (without informing via email) will be sent to the School.

- Informed or non-informed teaching evaluation [EE 06.04.02]. Each semester, a number of classes are selected for evaluation by an assessment team, which consists of one Quality Assurance office staffs and SEE's academic staffs [EE 06.04.03, EE 06.04.04]. The assessment team attends the class, evaluate the pedagogical criteria, the effectiveness of the use of teaching facilities and the faculty's expertise. Table 6-11 summarizes the number of academic staffs being evaluated and their average scores (on the scale of 5).

Table 6-11. Number of class evaluations (2014-2017).

Year	2014-2015	2015-2016	2016-2017
Number of academic staffs selected for teaching evaluation	22	11	6
Expertise score	4.4	4.7	4.7
Pedagogical score	4.2	4.4	4.2

For research activities, before the academic year of 2018-2019, each lecturer must perform scientific research activities, which is equivalent to 500 hours. This is equivalent to leading a school-funded research project, or being the first author of a published research paper. At the end of each school year, academic staff research hours are determined [EE 06.04.05]. In the new HUST regulation, there is a new measurement system for the academic staffs' research activities. A new index (Knc) is calculated based on all publications in one academic year [EE 06.04.06]. This index will be used to adjust the teaching staff salary, according to the new HUST regulation.

For other support activities, each lecturer can be assigned to manage 1 to 2 classes (class supervisor) [EE 06.04.07]. This support activity is very crucial for newly admitted students who are not used to the university environment and study style. The duty of the class supervisor is defined in HUST regulations [EE 06.04.08].

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

The need for self-training and development of professional competencies is determined and met

Recruited academic staffs, especially young lecturers will be encouraged to improve their academic profile, research and teaching proficiency. Through various communication channels, HUST and SEE informs young lecturers about scholarship opportunities for studying abroad [EE 06.05.01]. In the process of applying for scholarships, the staffs receive support from the SEE's board of director (recommendation letters), the HUST Office of External Affairs (translation of academic transcript), and their senior colleagues.

Table 6-12. List of lecturers sent abroad for Ph.D. study.

Year	Lecturer's name	Country	Status
2013	Trần thị Thảo	Taiwan	Finished
2014	Hoàng Anh	France	Finisehd
2012	Nguyễn Văn Ánh	Australia	Finished Ph.D
2012	Nguyễn Bích Liên	Australia	Finished Ph.D
2015	Nguyễn Đoàn Quyết	Germany	
2015	Nguyễn Hoàng Hiệp	USA	
2015	Nguyễn Thị Anh	Thailand (JICA)	Finished Ph.D
2016	Nguyễn Hồng Nhung	Japan (JICA)	Writing thesis

Professional capability is defined, measured and developed

Beside assisting young lecturers in pursuing graduate studies, every year HUST send academic staffs to various short training courses on pedagogical skills [EE 06.05.02], short-term staff exchange, etc.

Table 6-13. Number of SEE's academic staffs attending short study courses/staff exchange.

Year	2012	2013	2014	2015	2016	2017	2018
Pedagogical courses	02	03					
Pedagogical courses (HEEAP)	02	02	01	03	02	00	0
Hitachi Foundation fund[16] [EE 06.05.03]						1	1

In addition, lecturers can attend advanced professional courses such as the Nuclear Power course organized by the Ministry of Education and Training, exchange of foreign lecturers [EE 06.05.04]. SEE also receives invitations and send staffs to attend short courses organized by the Ministry of Industry and Trades, on the various topic of Energy planning with renewable energies [EE 06.05.05]. The lecturers are allowed to participate in professional and

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[16] https://www.hitachi-zaidan.org/global/activities/scholarship.html

exchange training programs in advanced countries, thereby establishing research topics, improving the research level of lecturers. Table 6-14 shows the scientific research works of the SEE increased gradually over time.

Table 6-14. Statistics of officials going on short/long term business trips.

Year	Short business trip	Conferences	Ph.D., Postdoc	Short-term training
2015	4	2	4	2
2016	19	8	4	1
2017	16	5	1	4
2018	8	4		1

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

The evaluation system with diversity and rigor through lecturing and evaluation, teaching volume, self-assessment of individual and subject teaching, inform and non-inform anticipation, lecturing hours and inspecting lectures, assessing teachers by students by the end of the term and the end of the school year [EE 06.06.01, EE 06.06.02].

- 15% of the highest performing school officials receive the title of "best employee" at the school level. At the same time, it is possible to receive the title of "best employee" at Ministry and Government levels [EE 06.06.03].
- Every year, 10% of the School's highest performing officials are considered for salary increase ahead of time.

One of the encouragements for scientific research is that the school can reward up to VND 10 million / ISI article, VND 2 million / Scopus article and VND 1 million / other. Besides, according to current government regulations, officials can apply for higher reward titles such as the Certificate of Merit from the Government, the Labor Medal (first, second, third), and noble titles such as the Elite Teacher and People's Teacher [EE 06.06.04, EE 06.06.05].

As mentioned in section 6.4, since the academic year 2018-2019, the academic staff research activities are converted to a publication score (Knc), which is based on publication records from the last 3 years. A professor/lecturer with a high number of publications can receive up to twice as much salary as another lecturer with the same teaching load [EE 06.06.06].

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

The research outcome of the staffs are supervised, managed and encouraged in a timely manner. The scientific research data come from a number of activities including scientific research works at all levels, publication of domestic/international papers [EE 06.07.01]

Table 6-15. List of research projects at all levels 2012-2016[17]

Research types	2015	2016	2017
National fund	03	03	01
Ministry of Education and Training	04	05	0
Industry	01	02	03
Nafosted	03	03	01
University	10	23	20
International cooperation		01	01

SEE also regularly hosts international conferences to improve staffs' research reputation, creating favorable opportunities for staff to participate in research, publication and scientific exchanges in the region and the world:

- IEEE Workshop on renewable energy, in 2013
- IEEE-ICSET – A well-known IEEE conference, sponsored by the IEEE Industry Application Society, in Hanoi, 2016 [EE 06.07.02][18]
- RCEEE - 2016 workshop sponsored by AUN-SEENET [EE 06.07.03]

The output of scientific research, in the form of journal articles and conference proceedings, are rewarded by HUST, based on an internal scoring system. An ISI paper is rewarded 10 million VND for all authors, and a Scopus paper is awarded 2 million VND [EE 06.07.04].

Table 6-16. Publication statistics 2012-2017

Publication types	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018
SCI journals	5	5	6	0	7	8	12
Other international journals	5	16	24	6	0	5	7
Domestic journals	10	28	20	60	62	62	61
International conference proceedings	59	27	16	9	22	71	54
Domestic conference proceedings	12	66	51	30	33	158	50
Total	**91**	**142**	**117**	**105**	**124**	**180**	**184**

Criterion 7   Support staff quality

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

Planning of support staffs at HUST

In the organizational structure of HUST, there are many functional units in charge of teaching support [EE 07.01.01]. The Academic Office oversees the students' course registration, manage all program curriculum of HUST, monitor students' academic performance. In all these functions, the Academic Office works closely with the university institutions to create a favorable learning experience for students.

The Office of Student Affairs is responsible for soft-skills training and provides students with study-related consultation and services such as health care services, providing guidance and support in students' pursuit of their educational goals. The office also assists students with scholarship, financial support. It is in charge of organizing job fair activities to assist students in finding prospective employers. Besides the official website[19], the Office of Student Affairs also has its own Facebook page, help to promote events more efficiently[20]. Every year, the Office performs surveys and share the results to HUST institutions (see also 11.3).

The library[21] has well-trained staffs of 38 (librarians), who regularly attend training courses, short-term, long term, capable of well serving the needs of exploiting information and materials of staff and students throughout the university [EE 07.01.02]. The library has its own website at http://library.hust.edu.vn/ and a Facebook page[22].

The center for sports culture and physical education[23] is responsible for providing the student with sports facilities (gym, swimming pool, football field), and physical training programs.

Table 7-1. Support staffs [EE 07.01.03]

Support staff	Qualification			Total
	Bachelor	Master	PhD	
Library	21	17	0	38
Laboratory staff of SEE	2	18	3	23
IT service	6	8	1	15
Administration	4	7	4	15
Other services (student affairs, medical service, dormitory, cultural center …)	71	5	3	79

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[19] https://www.hust.edu.vn/web/vi/phong-ctct-ctsv

[20] https://www.facebook.com/pg/ctsv.tuyendung.hocbong/posts/?ref=page_internal

[21] At HUST – the library is often referred to as "Ta Quang Buu" library

[22] https://www.facebook.com/TQB.library/?hc_location=group

[23] https://gdtc.hust.edu.vn/gt-can-bo-giang-vien

Total	104	55	11	170

Planning supporting staff at SEE

SEE has 3 supporting staffs in the office group, whose job is to assist the Board of Director, cooperate with the departments, and directly meet and process student requests [EE 07.01.04].

Most of the supporting staffs at all SEE laboratories belong to the Center of Practice and Experiment (TCEE) [EE 07.01.05]. The lab work and teaching load of TCEE staffs are under the management of SEE. The laboratory staff should ensure working hours according to regulations.

SEE's graduate students can be an additional resource for experimental lab assistance. SEE teaching staffs are facilitated to improve their qualifications. Some teaching staffs have Master degree, even doctorate. A teaching staff who have a doctorate can be considered to transfer to a to teaching staff, to make the best use of the staff resources [EE 07.01.06].

Academic advisory board

The Academic Advisory board provides help for students regarding the choice of program curriculum, assist students with difficulty in studying. While the Academic Office and the Office of Student Affairs are responsible for these tasks for all HUST students, the Advisory Board, whose members are teaching staffs, can assist students in more specific details related to SEE education programs (see also 8.4).

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

The recruitment of teaching staff at SEE and in the functional units of the University is carried out in accordance with the provisions of the Government officials' law in the recruitment, usage, and management of officials [EE 07.02.01], specifically the Decree on recruitment, use and management of public officials in the state-run units No. 29/2012 / ND-CP, April 12, 2012 [EE 07.02.02]. Recruitment criteria including criteria for qualifications, moral qualities as well as other requirements are widely announced at the school website [EE 07.02.03].

For SEE, the plan of human resource development for teaching staff is built based on the need to develop the EE/CEA training program; the number of students and teaching volume; the number of service personnel who are about to retire. The process of recruiting the staff of the Institute is carried out according to the unified process throughout the university.

For functional departments responsible for teaching, scientific research and other activities, the staff is planned and developed based on the workload undertaken by the unit; job positions required to perform specialized functions; the current staff size and the number of retiring staffs in the near future. Since the implementation of university autonomy, the school has developed a development strategy in the period of 2017 - 2025 with the goal of re-planning the functions of functional departments as a basis for recruitment and transfer of qualified and professional staff suitable to specific job positions. The transfer of service personnel between units is made public and widely announced throughout the school [EE 07.02.04, EE 07.02.05].

7.3 Competences of support staff are identified and evaluated

The teaching staffs at the supporting units in SEE are openly recruited according to the University's recruitment regulations, having the professional capability suitable to their position [EE 07.03.01]. According to the University regulations, after being recruited, the teaching staff will be contracted with a probationary period of 1 year. At the end of the probationary period, the staff will be publicly evaluated according to the University's regulations including self-assessment, review at the department. If the work requirements are met at the unit and the capability requirements are met, the apprentice staff will be able to sign the labor contract [EE 07.03.02]. The assessment and self-assessment of the performance of the staffs in the school year serve as a basis for staff rating [EE 07.03.03] and reward [EE 07.03.04].

In addition to the self-assessment and evaluation of the unit leader or the colleague's assessment, the service staff in SEE may also be evaluated through feedback from students on the level of satisfaction with training support activities, etc. [EE 07.03.05]. Recent survey results show that students are generally satisfied with the service team (Figure 7-1).
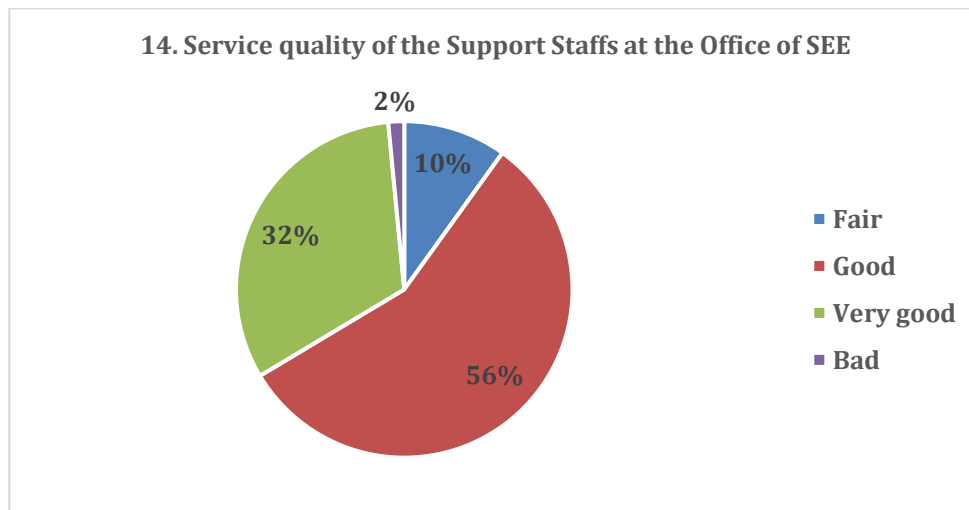
Figure 7-1 Extracted survey results on Support Staff service.

The teaching staffs of SEE in charge of the practical modules are evaluated through the form of the assessment with the same assessment process as for the faculty [EE 07.03.06]. The results of the assessment of service personnel are also used to serve as a basis for rewarding and reviewing salary before term.

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

The staff in charge of the experimental modules in the Power Engineering training program will be focused on training the skills of using the equipment, operating new tests when there are renovations/retrofit. These activities will be carried out with the participation of teaching staffs and laboratory equipment provider. Support staffs who work at SEE's laboratory have opportunities to pursue their graduate study, as do the teaching staffs [EE 07.04.01]. Some support staff can be transferred to teaching staff after having obtained the Ph.D. degree (see 7.1)

For the staff at the SEE office, in addition to the need to train soft skills in consulting, exchanging and handling daily tasks with students, they also regularly attended training

courses organized by the University such as: using Microsoft Office 365 software [EE 07.04.02]; training session to guide student registration and use of Academic Web portal to access students' information [EE 07.04.03]

For the staff at the school's functional units such as Library, Training Department, Department of Education and Training, Department of Material Facilities, Medical Center, Information Center, etc., in addition to general training courses about soft skills, information technology skills, etc., they can participate in professional development training courses suitable to their specific jobs. For example, library staffs can attend short-term courses in library operation [EE 07.04.04].

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

Every year, the staffs at SEE and the functional units in the University generally perform self-assessment on the degree of accomplishing individual tasks during the school year [EE 07.05.01]. Based on the guidelines of the school's emulation and reward proposal and self-criticism of individuals / collectives, the departments develop plans for assigning the following school year and propose rewarding titles or proposing to raise salaries ahead of term for individuals / collectives who complete tasks efficiently, and take initiatives to improve work [EE 07.05.01, EE 07.05.02, EE 07.05.03]. From September 2018, SEE has improved the assessment of the level of work completed according to some specific criteria as follows: Going to work on time, receiving positive feedback from students on attitudes and qualifications. The assessment results are recorded as a basis for calculating the salary increase for officials, thereby motivating staff in improving the quality of service for students.

Criterion 8   Student quality and support

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

Admission policies and criteria and methods of the School of Electrical Engineering (SEE) always follow the enrollment law of MOET and HUST. Since 2015, admission to universities has been based on the national high school graduation exam. The website http://ts.hust.edu.vn/ used by the university is the official communication channel for annual enrollment information [EE 08.01.01]. Information on subjects and targets is also available on the school website [EE 08.01.02]. Besides, university and specialized schools also make the most of social media to spread information faster, especially for high school students who usually are very active on social networks. At the time of writing this report, the fan page for students who want to apply for HUST in September 2019 has been introduced and has a lot of interaction[24].

Students entering the Electrical Engineering program will have two options for the exam: 1) Block A consists of three subjects: Math, Physics and Chemistry, scoring on a scale of 10, a maximum score of 30 points; 2) A1 block: Mathematics, Physics, English. Entry scores for the Electrical Engineering program are published on the university's website as well as on online newspapers.

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[24] https://www.facebook.com/groups/K64.dhbkhanoi/

Table 8-1. Entrance scores in the last five years [EE 08.01.03].

Year	2013	2014	2015	2016	2017	2018
Electrical Engineering major	23	21	25	27	27.25	21

Every year, the admission criteria and quota are reviewed by the SEE based on the overall expenditure of the university, through the meeting with experts from all departments [EE 08.01.04]. Enrollment criteria are given based on the SEE's capacity and forecast of human resource needs. These indicators are usually published in March every year.

Table 8-2 Entrance quota for Scholl of Electrical Engineering in the past 5 years[25]

Year	2014	2015	2016	2017	2018
Electrical Engineering major	*Shared the same entrance code with CEA program (KT24)*			250 (EE1)	220 (EE1)

Before 2018, students admitted to SEE did not have to choose major (EE or CEA) since their entrance. After the first year, the student can choose the program to study. Criteria for admission to EE or CEA programs are based on:

- Students' priorities
- First-year academic results
- Number of students registered in each program

Before 2017, the EE and CEA programs belonged to the same admission group (KT24). In recent years, a large number of high school students want to pursue the CEA program. As a result, the entry score of KT24 group was very high. This represented the high reputation of HUST, SEE and the CEA program. However, it also limits the number of enrollees to the EE program, due to the fear of not being admitted because of the high entry score. Realizing this issue, from 2018, SEE and HUST decides to split the entry groups and use different admission codes for Electrical Engineering (EE1) and Automation Control Engineering (EE2). This had an immediate effect, as the number of enrollees in the EE program has increased in the last two years (see Table 8-4).

8.2   Methods and criteria for the selection of students are determined and evaluated

As mentioned above, the method of selecting learners is defined and published in many ways [EE 08.02.01]. Before 2016, the elective subjects of SEE was Block A (Math, Physic, Chemistry). From 2016, students can apply to EE1 (Electrical Engineering) and EE2 (Control and Engineering Automation) with block A1 (Mathematics, Physics, English). The number of students enrolling annually in HUST is shown in Table 8-3. The number of admissions to EE program is shown in Table 8-4.

Table 8-3. Number of students enrolling annually in HUST

Year	Student		
	Register	**Elect**	**Enrollment**

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[25] Since 2017, the codename EE1 is used for the Electrical Engineering program, and EE2 is used for the Control and Automation Engineering

2017 – 2018 (K62)	1550	580	580
2016 – 2017 (K61)	1200	380	309
2015 – 2016 (K60)	11263	6907	5997
2014 – 2015 (K59)	10727	6425	5806
2013 – 2014(K58)	10356	6655	5789
2012 – 2013 (K57)	9725	5647	5095

Table 8-4. The number of students in Electrical Engineering over the years.

Year	53	54	55	56	57	58	59	60	61	62	63
EE	184	146	142	92	122	120	123	142	100	256	230

The admission quota of the Electrical Engineering program and other programs of HUST is announced on HUST webpage [EE 08.02.02]. The students register their choice through the Web portal. The Entry score will be decided based on the number of applicants applied to EE program and the admission quota. The final entry score is published via HUST and other online newspapers [EE 08.02.03, EE 08.02.04].

Table 8-5. Benchmark of entry scores in the EE program in 2017, 2018.

University/school	2017 (KT24)	2018 (EE1)
School of Electrical Engineering (HUST)	27.25	21
Electric Power University (EPU)	19	16
Da Nang University of Technology (DUT)	23.5	19.5
University of Transport and Communication	21.25	18.3
Hanoi University of Industry	22.5	18.9

Note that there was a decline in entry scores of all universities in 2018, compared to those of 2017. This was because the high school graduation exam in 2018 was more difficult[26]. Nevertheless, the HUST EE program maintained the leading position in terms of entry score. In fact, the EE program could have admitted more applicants fairly easily. However, HUST board of director always maintains strict criteria for students and decided to keep a stable number of admissions[27].

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

According to the regulations of HUST, the learning process of students is closely monitored, through the number of credits accumulated each semester. When students do not accumulate

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[26] This is done intentionally by MOET, so that the students can be classified more clearly

[27] https://laodong.vn/giao-duc/hang-nghin-nguyen-vong-rut-khoi-dai-hoc-bach-khoa-diem-chuan-se-thay-doi-nhu-the-nao-622042.ldo

enough credits according to the standard program - with the number of failed credits exceeding the permitted level, the software system will limit students' ability to register new courses. This rule ensures that students will have to re-enroll the failed credits and catch up with the curriculum [EE 08.03.01]. Different forms of warning also create pressure for students to make effort to improve their academic performance. In contrast, students with cumulative CPA points will be awarded scholarship by various scholarship programs [EE 08.03.02].

SEE staffs retrieve information from the Academic office, perform graduation rate statistics, the dropout rate of all students of SEE. The students' academic results are analyzed. For example, the bubble plot in Figure 8-1 shows that students in Electrical Engineering face the most difficulties with the subjects of the first and second year. The number of credits accumulated in the first two years is quite different (smaller) from the expected credit accumulation progress. Figure 8-2 shows that most 6th year students have CPA above 2 (which is a minimum requirement to graduate), which means the poor academic performance is not the main cause for delayed graduation.
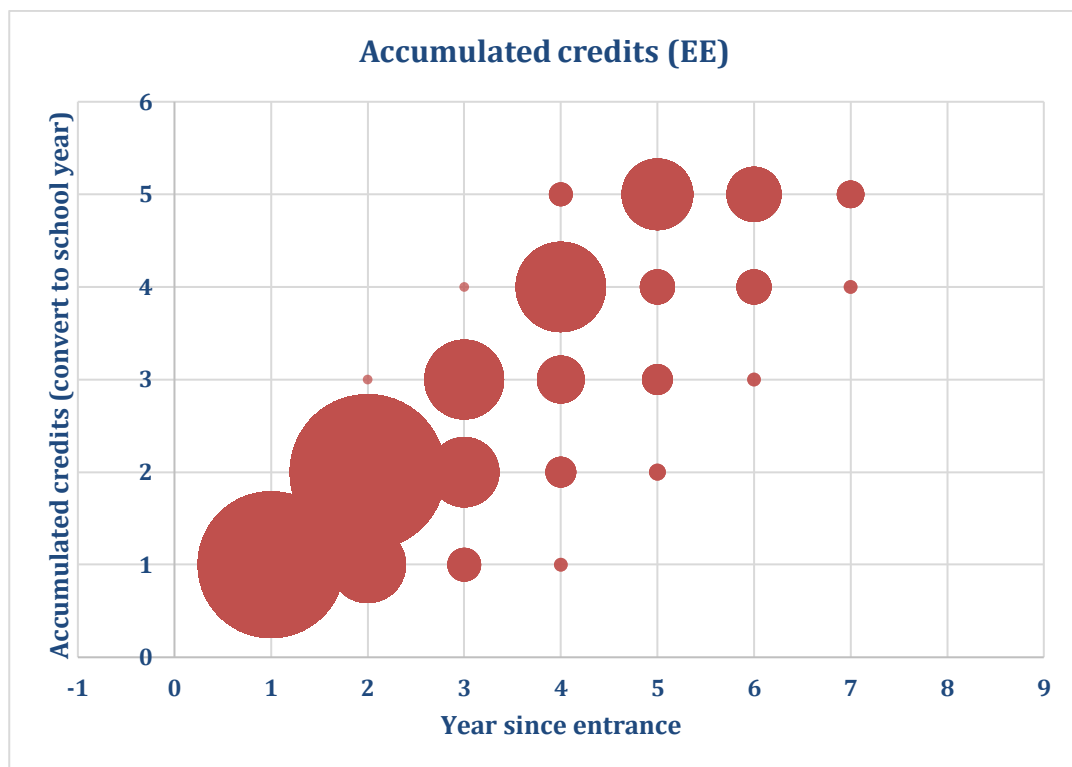
Figure 8-1 EE student statistic.

The software system and the network infrastructure for student monitoring have been developed and improved over the years, allowing easy monitoring of students' learning process. Each student is given an account, with an email address, to register for courses, track the accumulation of marks and check their graduation conditions [EE 08.03.03, EE 08.03.04, EE 08.03.05]. In the regular semester, each student can enroll a maximum of 24 credits. If a student has too many failed courses, the credit limit will be automatically reduced.

At the beginning of each term, the Academic Office provides the school with detailed information about students CPA points, failed courses [EE 08.03.06]. As a result, the school has information about the overall academic results of students and uses this information to analyze and adjust the program curriculums. SEE's board of director and the department heads

hold monthly meetings, in which students' academic performance data are presented, analyzed [EE 08.03.06].
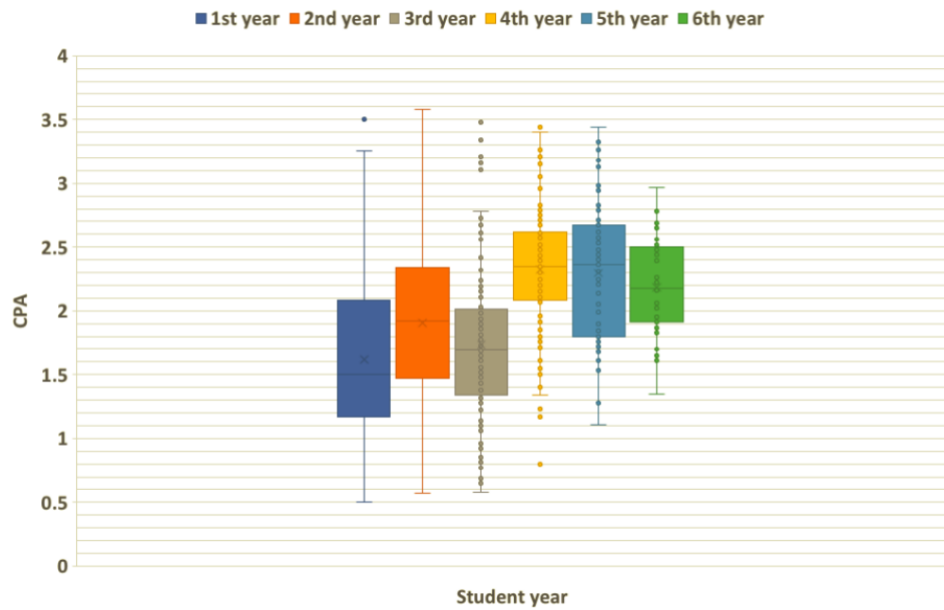
Figure 8-2 CPA of EE student, grouped by year.

Information regarding the scholarship offers is sent to students with good CPA [EE 08.03.07]. Student communication channels through the SEE support staff (see Criterion 7), fan page and Academic Advisor email address (cvht.see@hust.edu.vn) are also used frequently to contact with students [EE 08.03.08, EE 08.03.09, EE 08.03.10]. The application of information technologies and various communication media to exchange information with students is an aspect that SEE has received very positive feedback from student surveys (Figure 8-3).
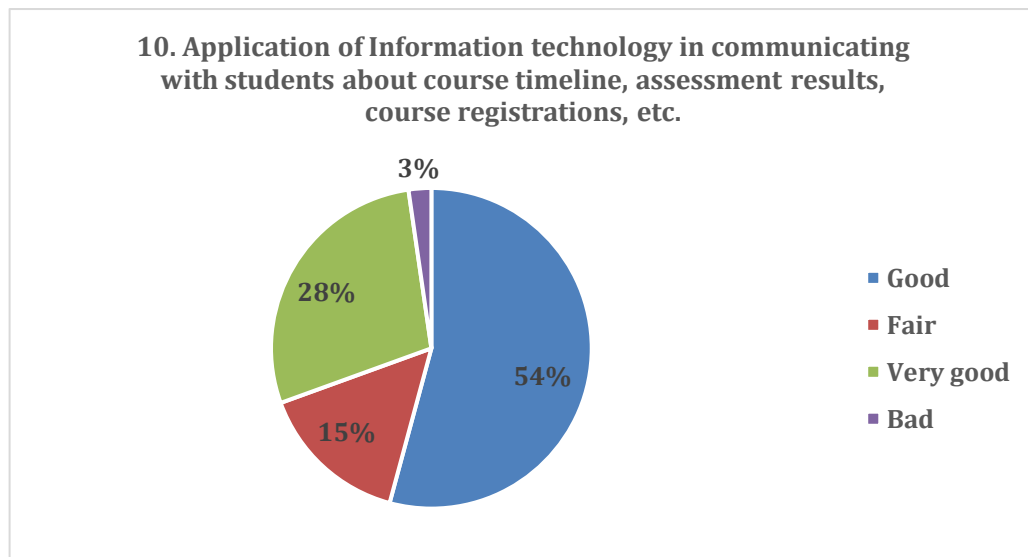
Figure 8-3 Student satisfaction level regarding SEE academic management system (2019).

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

Students are frequently communicated by the Academic office, as mentioned in section 5.2. Through the Academic Office webpage and fan page, students get information about study plan, milestones, calendar adjustment. The students can access their time table using the Web Portal [EE 08.04.01].

The SEE's Academic Advisory Board also communicate with the student, using the Advisory Board's email address [EE 08.04.02, EE 08.04.03]. SEE also organizes every semester a meeting with all students, to disseminate the contents of the regulations, the changes to be revised [EE 08.04.04]. As a large school, the number of classes and students' questions during the registration process is very high. In the 20182 semesters, the SEE Training team and Academic Advisor received 1600 requests assistance in study registration, coordinated 1700 requests to assign teachers to student project-based courses. All of the above requests must be completed no later than one week after the start of the semester. To shorten the processing time for students, SEE has used a system to receive requests to process online registration [EE 08.04.05]. When the results of lecturer assignment are available, the relevant students are notified by email [EE 08.04.06].

Another communication channel is the Youth Union, which is responsible for organizing extracurricular activities for students, organizing the introduction of Research Laboratories for new students [EE 08.04.07], participate in the university general arts and sports activities [EE 08.04.08].

As a research-oriented institution, undergraduate students engage actively in scientific research. Every year, SEE and other HUST institution organize a student research week in May, to promote student research activities (see 10.4)

The School of Electrical Engineering and the departments also regularly communicate with domestic and foreign employers [EE 08.04.09, EE 08.04.10]. The information pages of each department and school are also the places where job vacancies are announced. SEE also helps introduce students for internship at the prospective employers, to increase their chance of getting job early [EE 08.04.11].

8.5 The psychological environment, society and landscape facilitates the training, research and comfort for individual learners

Students of SEE actively participate in student scientific research activities, assisting academic staffs in their research projects. Besides the class hours, several students stay at SEE's laboratories [EE 08.05.01]. This activity strengthens the connection between academic staffs and students. SEE has recognized the importance of the student engagement in research labs, and thus introduce this activity for students since their first year.

Hanoi University of Science and Technology is particularly interested in student life in general, including boarding students. HUST students have easy access to the sports infrastructure such as gymnasiums, swimming pools, stadiums [EE 08.05.02]. The Bach Khoa Stadium is qualified to host national student sports tournaments.

Together with the Youth Union of HUST, the Youth Union of SEE actively organizes volunteer student activities, helping students improve social skills, improving knowledge through extracurricular activities [EE 08.05.03].

One of the most difficulties that high school students face when entering university is the change in the study environment, the assessment methods, and criteria. As also discussed in section 8.3 and 11.2, the academic results of the first-year and second-year students are usually lowest. SEE's Board of Director and the Advisory Board spends much effort to introduce first-year students to the challenges of university studies [EE 08.05.04]. The Academic Office and SEE advisory board also assist students who underperform, via direct conversation and emails. On the other hand, the reasons for students taking longer than expected to finish their program are also identified. Since dropout is a serious setback for students, the Academic Office, and university institutions put a lot of effort to help students on warning level 3 improve their situation (see Criterion 11).

SEE and recruiting companies regularly communicate to exchange information on job opportunities, the number of students who graduate each semester. The job announcements are spread to students via emails, SEE and its departments' fan pages [EE 08.05.05].

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

Currently, Hanoi University of Science and Technology has 265 lecture halls with areas from 40-160m2, located in area D, TC, Block T, B1 [EE 09.01.01]. The lecture rooms meet the requirements of the education program, including large lecture halls for theory study and small classrooms for exercise hours (if needed). Most classrooms are equipped with projectors, speakers and air conditioning systems. The classrooms and laboratories all have adequate lighting systems, ensuring illuminance of 300 Lux for classrooms and 350 Lux for labs [EE 09.01.02].

In general, the facilities of SEE in particular and of the University received positive evaluations from students and school officials [EE 09.01.03].
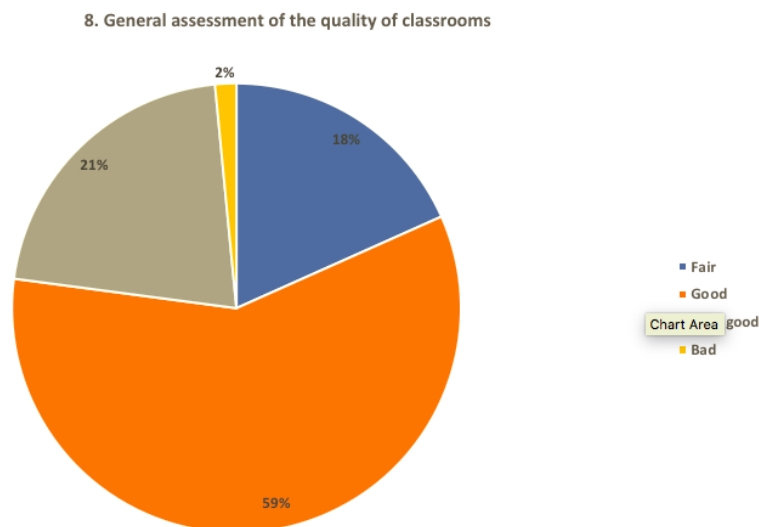
Figure 9-1 Survey results on the satisfaction level regarding teaching and learning facilities.

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

The electronic library of Hanoi University of Science and Technology was put into use since October 2006 with an area of 15000 m^2 with modern equipment of international standards. The number of textbooks and reference books is abundant with 92575 documents, basically meeting the needs of the HUST education programs. In addition, the school library system provides more than 6000 CD-ROMs and many other scientific journals. The library can also serve a large number of students and staff studying and researching, with 06 reading rooms, 2 borrowing rooms, 02 conference rooms, 02 group classrooms, and 02 multimedia rooms. The entire catalog of library materials can be searched online (http://dlib.hust.edu.vn) from school computers or at Library with 88 computers serving students [EE 09.02.01].

The library is supplemented with paper documents and electronic documents regularly to ensure updated materials for education and research. In addition, the library annually receives books and magazines from various sources [EE 09.02.02].

Table 9-1. Database statistics at the library.

Index	Document type	Quantity
1	Vietnam Journals/Magazines	9 types of Magazines, 49 types of journals
2	Foreign Books of the School of Biotechnology and Food Processing	09 books (09 titles)
3	Foreign Books of the School of foreign languages	49 books (48 titles)
4	Reference Books of 2015	1131 books (217 titles)
5	Database of Electronic Books - Ebrary	01 database
6	Database of buy-share magazine	01 Proquest Central
7	Books gifted from 24 LTK	130 books (130 titles)
8	Business documents	14 books
9	Books gifted from the School of Mechanical Engineering	143 books (143 titles)
10	Theses	1428
11	Dissertations	56
12	Bachkhoa publishing house	50 books
13	Individual	440 books
14	Trial databases	03 databases (SPIE, ASCE, Ebary)

Every year, the library updates the list of books related to all academic programs of HUST and coordinates with institutes and schools in HUST to add additional references and

textbooks for the library [EE 09.02.04, EE 09.02.05]. Figure 9-2 shows the extracted survey results about the library facilities and computer systems.
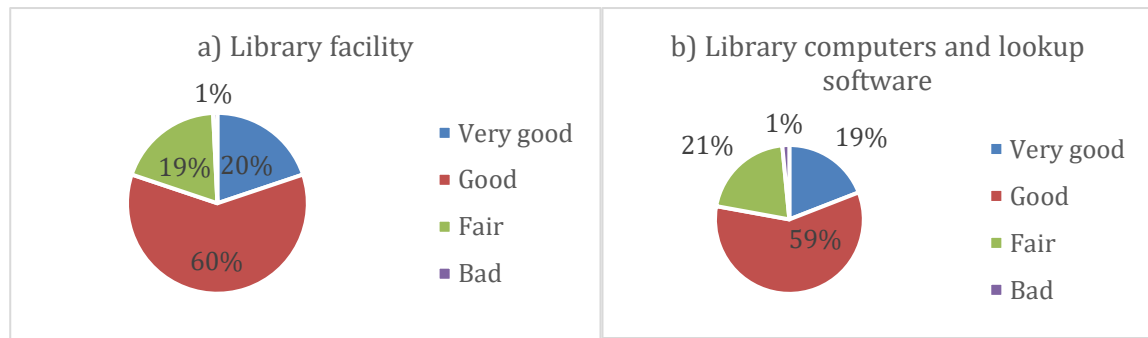
Figure 9-2 Satisfaction survey of the library system.

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

The entire Electrical Engineering program has 17 modules that require experiments, of which there are 4 subjects of basic knowledge, 13 subjects of basic and core knowledge, 02 subjects in the specialized courses.

- The subjects belong to the basic knowledge block using the common labs of the school: Physics laboratory, and computer lab practice

- The subjects belong to the basic and specialized knowledge blocks using the laboratories of the Institute of Electrical and other departments in the Institute.

The following is a detailed list of subjects that have experiments and practices in the training program 2009 - for Electrical Engineering program [EE 09.03.01].

Table 9-2. Subjects and place of experiment

No	Subject	Place of experiment
1	PH1110 General Physic I 4(3-2-1-8)	05 Laboratories of General Physics Department
2	PH1120 Physic II 4(3-2-1-8)	05 Laboratories of General Physics Department
3	IT1110 General Informatics 3(3-1-1-6)	Computer center
4	EE1010 Introduction to Electrical Engineering	Center for electrical engineering practice
5	EE2020 Circuit theory I 4(3-1-1-8)	Circuit theory lab, Department of instrumentation and industrial informatics, Center for Electrical Engineering Practice
6	Electromagnetics 3(2-1-1-6)	

7	EE3110 Analog electronics 3(3-1-1-6)	Digital Lab, Department of instrumentation and industrial informatics, C1-314
8	EE2120 Circuit Theory II 2(2-0-1-4)	Circuit theory lab, Department of instrumentation and industrial informatics, Center for Electrical Engineering Practice
9	EE3110 Measurement techniques 3(3-1-1-6)	Measurement laboratory, Department of instrumentation and industrial informatics C2
10	EE2130 Digital system design 3(3-1-1-6)	Digital Lab, Department of instrumentation and industrial informatics, C1-314
11	EE3140 Electrical Machine I 2(2-1-0.4-4)	Electrical machine and control laboratory, Department of Electrical-Electronic equipment C1-106
12	EE3410 Power electronics 3(3-1-1-6)	Electronic Laboratory, Department of Automatic Control, Center for Electrical Engineering Practice
13	EE380 Microprocessor 3(3-0-1-6)	
14	EE3423 Electric supply systems 3(3-0-1-6)	C1-119
15	EE3510 Electric drive 3(3-1-0.5-6)	Electric drive laboratory, Department of Automatic control, C2C9
16	Electrical materials	High-voltage Laboratory, C1 - 119
17	Power system experiment I	Network and electrical system laboratory, C1 - 115
18	Power system experiment II	Electrical system protection and control laboratory, C1-116
19	Laboratory of Renewable Energy (C1-120)	Preparation of experiments are underway. This laboratory will be used in the revised EE program curriculum

Some laboratories are also used for research by specialized disciplines. In the near future, SEE will be equipped with modern teaching and research labs, under the loan of the World Bank[28] [EE 09.03.02].

In the Electrical Engineering program, especially in the Power engineering major, the simulation software has very important roles. In recent years, SEE has received several sponsorships from industrial partners to upgrade experimental equipment as well as simulation software.

- ATS's modern substation automation simulation suite, in 2013

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[28] http://www.worldbank.org/vi/news/press-release/2017/05/15/world-bank-funds-us155-million-to-support-autonomous-higher-education-in-vietnam

- VEngy station automation simulation suite, using Toshiba equipment [EE 09.03.04], in 2017
- PSS / Sincal (Siemens) power grid simulation software, in 2017
- ETAP power grid calculation software [EE 09.03.03], in 2019
- EVN sponsored simulation lab [EE 09.03.06], in 2018

9.4 Information systems (including online learning infrastructure) are adequate and up-to-date to support training and research activities

HUST has one computer center on the 3rd floor of D5 building with 200 computers for practical training on computers. An internal information network of HUST covered by a wired network to all areas of the school, with the main backbone is a fiber-optical network. Some central areas of the school are covered with a wireless network.

Main services on the network:

- HUST's website is designed according to advanced standards for university websites
- Email service for all staff and students
- University training portal
- Postgraduate training portal
- Student and alumni portal
- Video conference
- Internal services

Since 2016, WIFI signal has been covered throughout the campus of HUST, under the university ICT infrastructure upgrading project. HUST's network has more than 6000 computers that can be connected to the system. The BKNIC Center has a technical team to support and support the establishment of networks, software, and IT support [EE 09.04.01].

In 2018, the information network center also introduced a multimedia room operation. Besides, last year, the information network center also implemented the use of some software to support teaching as well as training management, such as e-Office system, 365 Office 365 software, Yammer [EE 09.04.02]. The use of Microsoft Office 365 has enabled efficient communication between HUST staffs and students, using state-of-the-art features, such as Group chat, cloud data sharing, Flows, Forms.

The new website and software for the management of teaching assignments, personal class schedules, and time table were completed in 2018. The school directors, department heads and academic staffs are provided with different levels of access to assign teaching assignments, supervising the teaching volume of lecturers and class schedules. Training management software also allows for the calculation of teachers' additional income, based on internal spending regulations issued by each institution [EE 09.04.03].

9.5 Environmental, health and safety standards are identified and implemented taking into account the specific needs of the disabled

HUST requires 100% of students and staff to have health insurance. In case of accident or illness, students and staffs can go to the University's Medical Center [EE 09.05.01]. Health care work for students and staff is regularly carried out by the University [EE 09.05.02]. In recent years, HUST Medical Center organized an annual overall health check for HUST staffs. HUST Medical Center has 04 rooms for patients, 20 beds with full specialties such as Odonto-Stomatology, internal and laboratory tests. The medical center has regular staffs, providing

the initial medical treatment and emergency services for all students 24/24 hours. The prevention and control of epidemics, environmental sanitation, and food hygiene and safety are actively monitored [EE 09.05.03].
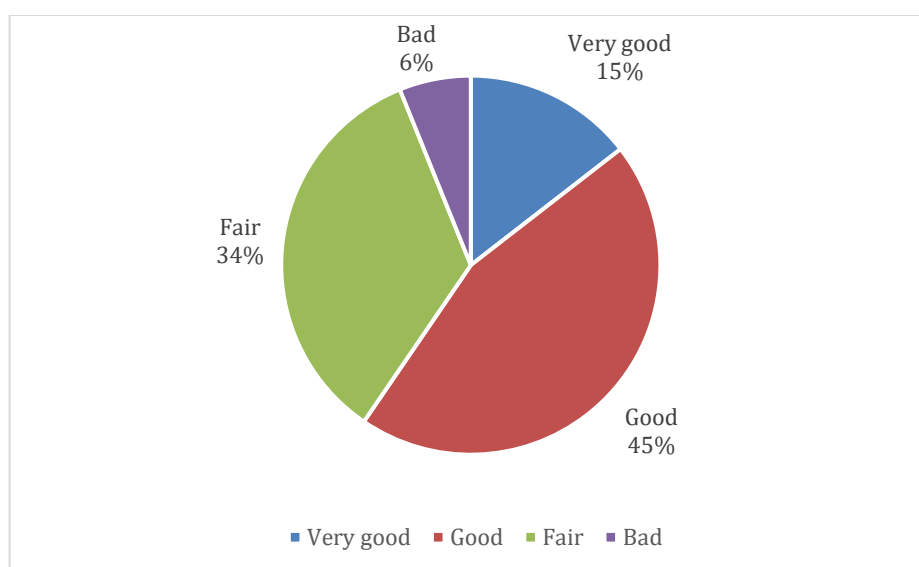
Figure 9-3 Student and staffs feedback on the university medical services.

Fire systems and processes are clear and complete. Laboratory staff and students are trained on the process and use of fire fighting equipment annually.

Table 9-3. Number of visits at the medical center.

Year	Entrance examination	Graduation examination	Visit during office hours	Emergency outside office hours
2011 - 2012	5.138	3.258	12.213	394
2012 - 2013	5.509	3.012	15.982	452
2013 - 2014	5.720	4.597	16.271	312
2004 - 2015	6.294	4.435	17.568	579
2015 - 2016	5.270	4.438	17.901	684

Hanoi University of Science and Technology is also one of the first academic institutions owning a standard swimming pool, national standard stadium, tennis court, outdoor basketball, volleyball court and a multi-purpose indoor gymnasium in Hanoi. Currently, Bach Khoa Gymnasium as well as sports centers not only meet the standard of physical training but also qualify for organizing national events such as the Professional Basketball League, National Sports Congress.
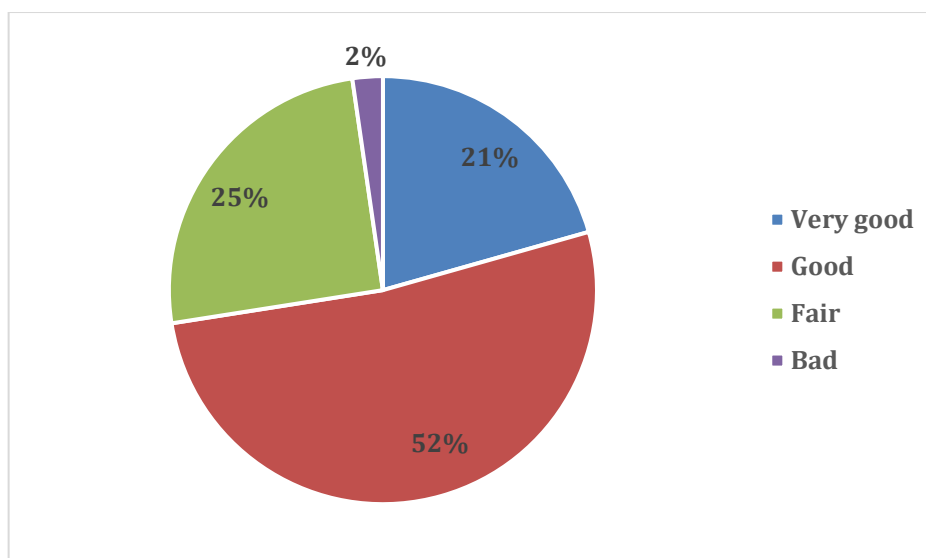
Figure 9-4 Student and staffs' feedback on the sports facilities.

Recently, the school has also invested in building a football field with a fairly spacious and modern artificial grass system. However, the university should consider having a number of areas to support students with disabilities so that they are also able to participate in sports activities with their schoolmates.

The dormitory of HUST is divided into different classrooms with different prices. Detail:

- B10 building has room up to 60m2, fitted with ceiling fan, bunk bed, locker, study table and can accommodate 12 students at the same time. The system of toilets and bathrooms is private, the monthly price is VND 220,000
- B6 and B9 buildings with an area of 35 - 40m2 each, and can accommodate from 8 to 10 students. The monthly price is VND 200,000 - 210,000 VND

The dormitory canteen serves catering needs for students because cooking is not allowed in the dormitory to avoid the risk of fire and explosion. Students can also come here to buy school supplies, groceries such as soap, washing powder, phone cards. If there is a need, they will also be provided with laundry service for "student" prices, ranging from VND 10,000 - 15,000 / kg of clothes. A modern canteen and cafeteria for staffs and students was set up at D2A building since 2016 [EE 09.05.04].

Criterion 10 Quality enhancement

10.1 Stakeholder's needs and feedback serve as input to curriculum design and development

In the process of designing the program curriculums, a Curriculum Design Committee is first set up. Special attention is paid to the curriculum design process, such that the feedback from relevant stakeholders are considered [EE 10.01.01]. HUST and SEE have a system of feedback of stakeholders (students, alumni, lecturers, businesses ...) via online survey questionnaires with addresses on the website of the School of Electrical Engineering, including[29]:

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[29] https://see.hust.edu.vn/-ia-chi-lien-he

- A questionnaire survey of students studying at the School
- A questionnaire survey of graduates
- A questionnaire survey of alumni
- A questionnaire survey of companies/ organizations about educating quality
- A questionnaire survey of enterprises/ organizations about internship students
- A questionnaire survey of lecturers/ staffs about educating program

This feedback system has been implemented since 05/2013 and has attracted many students and alumni to contribute their comments. Hundreds of responses have been received annually, with many positive contributions and suggestions to improve the quality and educating program [EE 10.01.02].

One important feedback channel for the program curriculum is via staff feedback. Currently, the academic staffs' feedback is collected directly at the regular weekly meetings of the School's departments. Besides, there is one general meeting that is held each year. In this event, feedback of teaching staffs, support staffs are gathered and discussed openly [EE 10.01.03].

The survey of graduates is an information channel to assess the labor market's feedback on the current educating program. Surveys conducted annually by the School of Electrical Engineering, starting in the 2005-2006 academic year, aim to generalize the picture of job search and employment quality of college students and university in the labor market in the first few years after graduation [EE 10.01.04]. Through the collection of information, as well as analysis and assessment of the employment situation of graduates, the survey will:

- Provide valuable information about the ability of graduate students to participate in the labor market;
- Evaluate the relevance of the curricula for students' jobs, answer questions about whether or not the knowledge and skills, the standards of behavior, attitudes, as well as another substance of the graduate students is in accordance with the requirements of the employer;
- Provide information so that universities and colleges can improve the effectiveness of training plans and programs, including content and curriculum, teaching materials, and teaching tools
- Implementing human resource development programs that meet the new requirements of teaching.
- Provide information for career guidance and job placement for graduates.
- Implementation of programs to promote university-industry cooperation.

To improve the industry feedback in the curriculum design process, surveys on prospective employers of HUST graduates are also carried out [EE 10.01.05]. When the new Curriculum Design Committee was established in 2017 to revise SEE's program curriculum, an official from EVN[30], which is an important partner of SEE and HUST, was invited [EE 10.01.06].

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[30] Dr. Nguyen Duc Cuong, Director of the National Load Dispatch Center, EVN. He is also a HUST alumni.

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

The design and development of the teaching program at the School of Electrical Engineering are based on the CDIO guidelines, and follows the steps below:

- Set up a curriculum design committee. Members of the committee are Professors, Associate Professors, senior lecturers, teaching staffs who are in charge of the academic program, and a member from the Industry (see 10.1)
- Based on the CDIO guidelines and based on reviewing the program learning outcomes of similar programs, the curriculum design committee discuss and identifies key elements of the existing curriculum that needs revision [EE 10.02.01].
- The curriculum design committee reviewed the existing ELOs and benchmark with ELOs from similar program worldwide[31], and draft the revised Expected Learning Outcomes.
- Set up surveys and organize conferences to receive feedback from stakeholders for the revised ELOs. The conference was held on July 14th, 2017 [EE 10.02.02]. SEE has invited its alumni, prospective employers, colleagues from other universities.
- Based on the survey results and further discussion, the Committee prepare a final draft of the ELOs, the documentation on the new program curriculum and inform relevant stakeholders [EE 10.02.03].
- Assign the teams of Academic staffs to each of the course in the new Curriculum.

First minutes of meeting of the current Curriculum Design Committee [EE 10.02.01] identified some major changes that need to be implemented: i) Expected Learning Outcomes need to suit the modern workplace, especially in the international and inter-disciplinary context; ii) Enhance the connection between the general knowledge block and the concentration modules. For examples, students need to understand the need of the Numerical Computation (which is a general course) in the EE program, thus this course needs to be emphasized and MATLAB practice sessions are necessary; iii) Consider a new concentration on renewable energy[32]. Since then, the Curriculum Design Committee has been actively working to design the new revised programs in Electrical Engineering and Control and Automation Engineering.

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

Feedback system from students

HUST has strict regulations on reviewing and evaluating the teaching and learning process, assessing the learning results of learners through the School's Training Regulation [EE 10.03.01]. The monitoring, evaluation, and processing of learning results of learners are managed throughout the University by the Academic Office. At the end of each semester, the Academic Office sends surveys to students attending the course [EE 10.03.02].

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[31] See section 2.1

[32] Minutes of meeting on June 13th 2017

In conjunction with the survey of the Academic Office, SEE regularly carry out surveys on the training program [EE 10.03.03]. Recent surveys have shown positive feedback from graduate students on the relevance of the program curriculum with regard to the ELOs, the Inter-disciplinary aspect of the program, transparency of the assessment process, up-to-date level of the program (Figure 10-1) [EE 10.03.04].
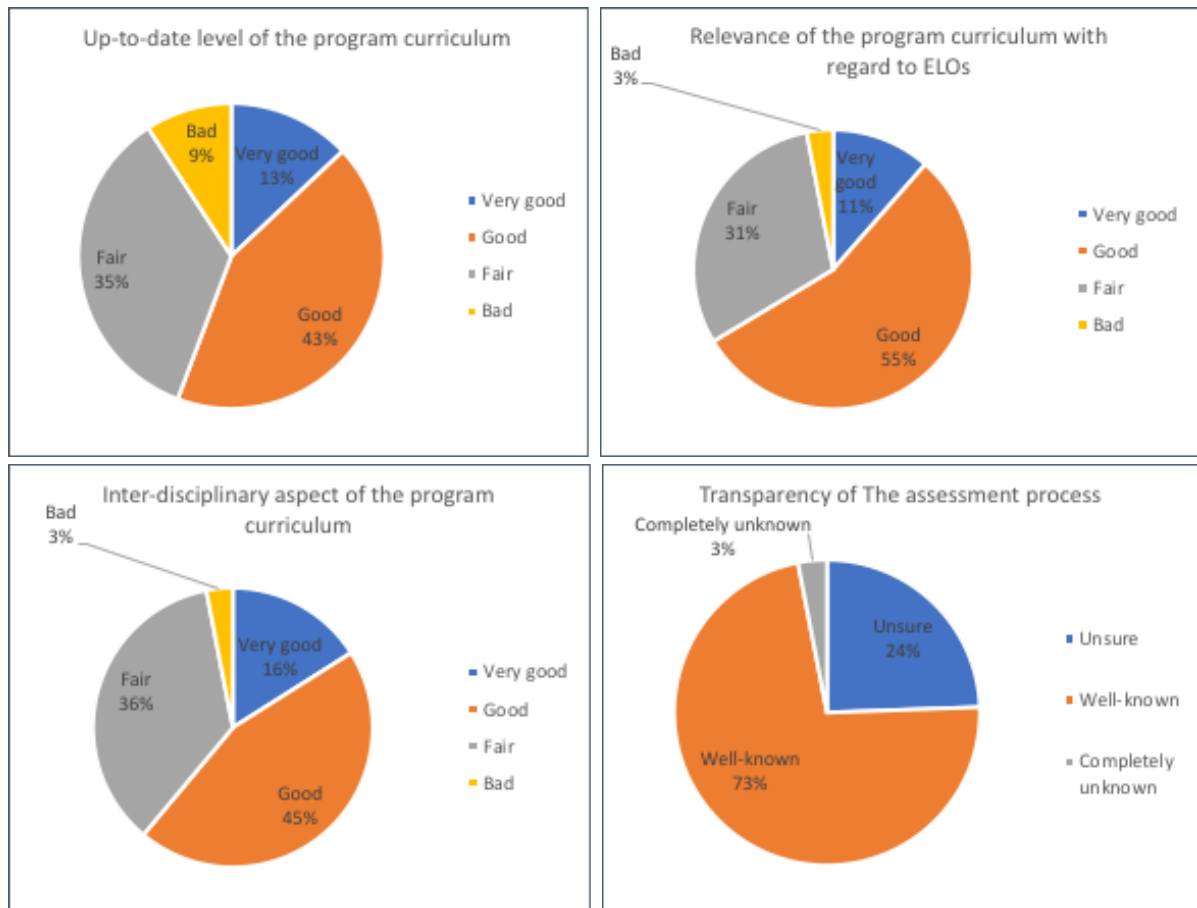
Figure 10-1 Excerpt of survey results (graduate students).

The assessment of the quality of teaching subjects is done regularly through observing lectures. The University's Quality Assurance Center coordinates with the School's Quality Assurance team (including staff and professional groups, managers at the Department level and Institute level) to plan the time. Currently, both forms of noticed evaluation and without-notice evaluation are being implemented. The results are summarized to evaluate, thereby contributing to improving the quality of teaching of lecturers. The assessment is conducted according to the standard process with standard university assessment forms [EE 10.03.05].

Every year, the Scientific Council of SEE conducts a review of issues related to the School's expertise. Comments on the review and evaluation of the teaching and learning process in the scientific council meeting are recorded in the minutes of the meeting, serving as a basis for a decision on implementation [EE 10.03.06].

10.4   Research output is used to enhance teaching and learning

As a research-oriented university, HUST and SEE always focuses on scientific research. The students of the School of Electrical Engineering are encouraged to participate in research activities with faculty members. In some laboratories, there is research tasks suitable for

students right from the first year, until intensive research activities at the graduate level [EE 10.04.01].

The student research activity has been recognized as one of the most efficient method for students to get used to the university style of studying. Instead of doing homework with known answers, research activities introduce students to engineering problems for which several solutions exist. Thus, the students can learn the compromise between different aspects of the engineering design, the engineering and economic issue of each solution. Many student research topics come from their supervisors' research projects [EE 10.04.02]. The most active students in research activity are usually those who get good job offers and are highly appreciated by their employers. Many students have published journal papers (see 11.4).

In an effort to bring scientific research results to improve teaching and learning, the School of Electrical Engineering has also included SEE lab-tour activities as an annual activity, to introduce new students to the SEE laboratories [EE 10.04.03]. This activity can also be considered as an orientation in which stimulating the students' passion for learning and research while disseminating the study and research experience to all students. In addition, there is an annual student research competition.

Table 10-1. Statistics of topics and number of students participating in scientific research[33]

School Year	Number of students participating in scientific research	Number of registered projects
2011-2012	38	13
2012-2013	31	12
2013-2014	29	13
2014 – 2015	45	19
2015 – 2016	24	16
2016 - 2017	68	26

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

Hanoi University of Science and Technology has regulations on quality assurance of services to support teaching and learning activities (support of libraries, laboratories, information systems, etc.). Quality of support services of libraries, laboratories, information infrastructure, throughout the University is monitored and evaluated by the Quality Assurance Office[34]. The

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[33] All students in SEE

[34] https://www.hust.edu.vn/trung-tam-am-bao-chat-luong

repair and upgrading of support services have a specialized department[35], focusing on handling urgent situations, as well as the requirements of renovation and upgrade annually. Currently, feedback messages on the classroom facility are handled very quickly, thanks to the Microsoft Office 365-based group chat[36].

In addition to supervision and inspection of specialized departments, feedback on the quality of student support services is also systematically collected from students as shown in section 10.1In the surveys, the questions related to the quality of support and utility services are also mentioned [EE 10.05.01]. The survey results after being counted, analyzed and evaluated by the Quality Assurance Department will be sent to relevant departments (libraries, laboratories, IT and other services) in order to plan for upgrading and improving the quality of the school's teaching and learning support services.

Every semester, there is an observation of experimental instruction, to directly evaluate the quality of the lab's experiment guides, get feedback from students about the experiment content, laboratory equipment, and how to guide the experiment, support staffs quality. SEE also has a dedicated fund to renovate and retrofit of laboratory equipment [EE 10.05.02].

In the next few years, SEE and other HUST institutions is going to receive a substantial investment to upgrade modern laboratories for teaching and research [EE 10.05.03]. The teaching laboratories will enhance the teaching quality and learning experience, while the research lab will help improve the research quality, the number of publications, and attract more students to doing research [EE 10.05.04].

10.6   The stakeholder's feedback mechanisms are systematic and subjected to evaluation and enhancement

The mechanism for setting up surveys, processing and managing feedback results of the School of Electrical Engineering as well as the Quality Assurance Department is implemented according to ISO 9001: 2008. In other words, the investigation mechanism receives feedback from the School of Electrical Engineering's stakeholders to be systematically ensured, evaluated and improved according to a clear cycle (Figure 10-2).

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[35] https://www.hust.edu.vn/phong-co-so-vat-chat

[36] Microsoft Team: https://products.office.com/en-us/microsoft-teams/group-chat-software. HUST uses Microsoft Team not only as a feedback channel, but al so as transparent communication media between all university staffs and the Rector Board.
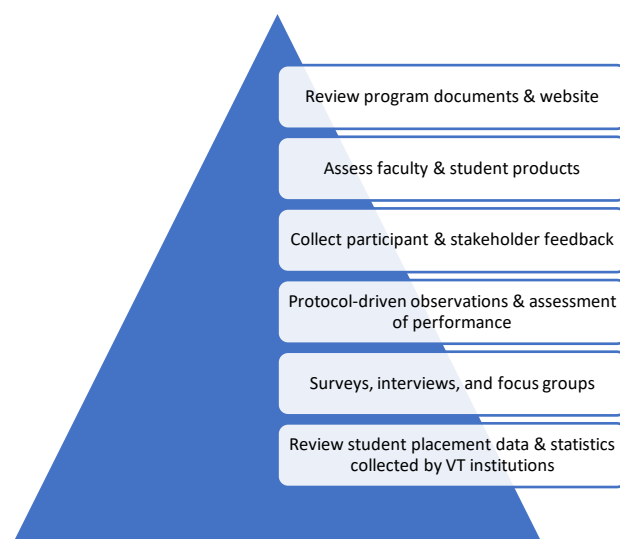
Figure 10-2 Evaluation Methods and Measures.

Comments of lecturers, researchers and staffs are obtained through the annual employee meetings, reports of self-assessment of officials, departments and the School of Electrical Engineering. The Academic Office regularly takes feedback of students regarding the courses they undertake (see section 10.3)[EE 10.06.01]. The survey results are sent back to SEE's board of Director for reviewing. A negative feedback that re-surfaces consistently on a course will be reviewed carefully by the SEE board of director and the Departments' Heads.

Feedback from graduate students is received via various channels. Annually, the Office of Student Affairs sent a questionnaire to graduate students and share the survey results to all University Institutions (see 11.5). SEE also performs its own survey on the graduate students [EE 10.06.02].

Criterion 11 Output

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

The work related to the class activities, the students' assessment marks, GPA and CPA is managed by the Academic Office of HUST. SEE and other institutions work closely with the Academic Office to get the academic performance data, as well as the survey results.

As shown in Section 8.3, The School of Electrical Engineering closely monitors students' results, including cumulative CPA points, the number of registered credits. The percentages of graduate students who do not complete the program are also monitored. Statistics on the percentage of good and excellent graduates, the percentage of dropout students, and the annual graduates (in Electrical Engineering) in the evaluation period 2013-2018 are shown in the following table [EE 11.01.01][37].

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[37] This statistic is done for all SEE students from both EE and CEA programs from K52 to K58. Roughly 3300 academic records were analyzed.

Table 11-1. Graduation rate of electrical engineering students in the last 5 years.

Promotion	Cohort size	Completed degree within 5 years	Completed degree after 5 years
54	146	97 (66%)	44 (30.1%)
55	142	75 (52%)	34 (23.9%)
56	92	61 (66%)	39 (42.4%)
57	122	63 (51.6 %)	59 (48.4%)
58	120	38 (32%)	N/A

Graduation statistics show that the previous promotions (before K56) had a high graduation rate. However, in two recent promotions, the percentage of graduates on time has declined. This is a worrying indicator to be considered.

Statistics of dropouts of Electrical Engineering students in recent years are given in Table 11-2, Table 11-3 [EE 11.01.02]. In addition to listing the number of students who dropped out of school, SEE also list cases of dropout because of poor academic performance (CPA below F). Compared to the number of entrances, the dropout rate due to poor academic results is quite small. On the other hand, the results also showed that most students have problems with general subjects, as the dropout rate in the first 3 years is quite high. This result coincides with the analysis results in section 8.3. One reason is that high school students entering the university are not familiar with the new educational environment, thus their academic performance in the first years are not as expected.

Table 11-2. Statistics of dropouts of Electrical Engineering students.

Promotion	1st year	2nd year	3rd year	>3 years
54		2	3	7
55	2	6	4	10
56	2	5	3	4
57	8	9	3	4
58	13		2	2

Table 11-3. Statistics of dropouts of Electrical Engineering students, with CPA <1.0.

Promotion	1st year	2nd year	3rd year	>3 years
54		1	1	
55		4	2	2
56	2	1		
57	4	2	2	
58	8		1	

It should be noted that with the training regulations of HUST, a student is only forced to drop out of school after the number of failed credits have exceeded 27, and the student could not improve his/her situation in one semester. Therefore, the fact that students quit school in the third year, even after that, is still mainly due to the poor results accumulated from the first two years. In the 3rd to 5th year, the percentage of poor grades leading to dropout is very small.

The issue of delayed graduation and dropout are of great concerns, both for the University, as well as the School of Electrical Engineering [EE 11.01.03]. The Academic Advisory Board

and SEE's board of director communicate the issues with the Academic Office, the departments and the students (see also section 8.3 and 8.4). The students on warning level 2 and 3 are given advice to avoid dropout. Usually, these students are advised to slow down the study plan and take time to retake the failed credits. The Academic Office and SEE also coordinate to organize classes (even with a few number of students) so that students on warning level 3 can retake courses, and meet the requirements for doing graduate thesis and finish the program in time [EE 11.01.04].

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

As stated in 11.1, the School of Electrical Engineering regularly performs the statistics of graduation rates, dropout rates, as well as the average graduation time of all students, including students in Electrical Engineering [EE 11.02.01]. Students on warning level 2, 3, who are most likely to graduate late are listed, with the assistance of the Academic Office. The Academic performances of these students are analyzed to identify their common challenging issues [EE 11.02.02]. Based on this data, SEE board of director and the department heads hold meetings and discuss solutions for improvement [EE 11.02.03].

The average graduation time of students of the School of Electrical Engineering during the evaluation period (2014-2017) is shown in Table 11-4. In general, the data show that the graduates from recent promotions follow closely the 5-year plan. The HUST uses the credit system and allows students to register up to 24 credits in one semester. This method encourages students to graduate earlier than the specified time of the designed training program. However, this system also allows students to retake courses to get a better grade. Thus, some students may have longer graduation time to improve their CPA.

Table 11-4. The average graduation time of EE students in recent promotions [38]

Course	K54	K55	K56	K57
Average graduation time	5.28	5.40	5.29	5.10
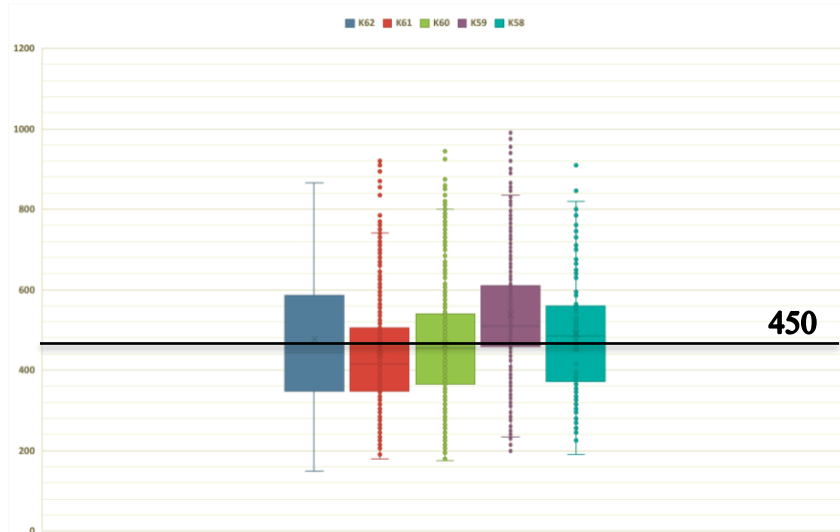
Figure 11-1 EE students' TOEIC scores.

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[38] Average duration of students already graduated.

One of the output standards of Hanoi University of Science and Technology is that students must have a TOEIC certificate above 450 before having a graduation thesis project. The foreign language output standard is moderate, as many of HUST students mostly come from rural areas where there is still some difficulty in learning foreign languages.

As can be seen in Figure 11-1, the TOEIC scores of EE students gradually increase from 3rd to 5th year. This indicates the effort of students to improve their English proficiency, which is a pre-requisite for graduation. However, a fair number of students at the 6th year since their entrance have significantly lower TEOIC scores than the 450-threshold, resulting in their delayed graduation[39].

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

In addition to the survey results of newly graduated and alumni, carried out by the Office of Student Affairs of the University, the departments of the School of Electrical Engineering also organizes annual job surveys of graduates [EE 11.03.01]. SEE's recent survey show that most graduate students find jobs which closely relates to their study program.
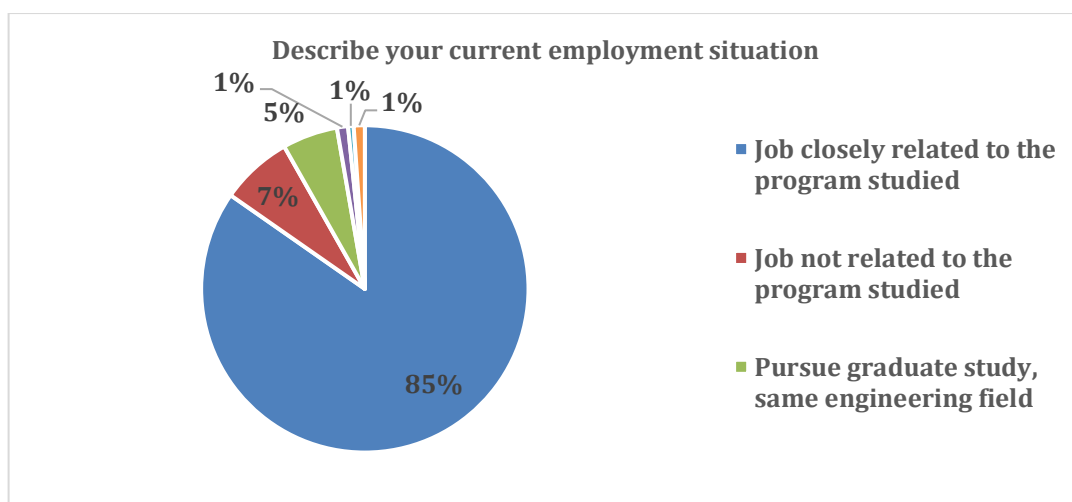
Figure 11-2 Excerpt from SEE student survey results.

Statistics of the average income of graduates are also established by the School [EE 11.03.02]. For example, Figure 11-3 shows the survey results on the salaries of graduates in 2017. According to statistics, the salary range of 6-to-8 million VND and 8-to-10 million VND account for about 60% responses. In addition, about 29% have a salary of 10-to-20 million VND. According to a recent Jobstreet survey[40] on the Vietnam labor market, HUST graduate salary spectrum is slightly above average.

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[39] HUST increased the frequency of TOECI exams, so that students have as much chance as possible to improve their TOEIC score and fulfill the graduation requirements.

[40] http://cafef.vn/sinh-vien-viet-nam-moi-ra-truong-nganh-nao-luong-cao-nhat-20160627142059626.chn
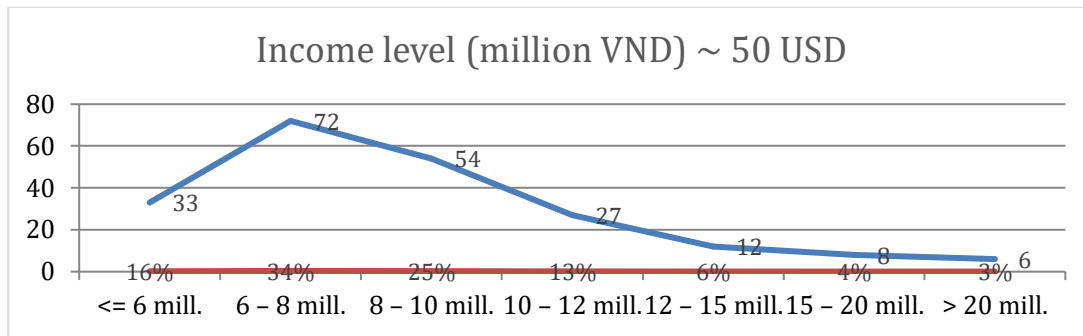
Figure 11-3 Salary spectrum of HUST students after graduation (2017)[41].

The surveys of employability of graduate students are carried out annually by the Office of Student Affairs. The most recent survey results show that 88% of SEE graduates find a job within one year.

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

The School of Electrical Engineering has a long-term scientific research development strategy, [EE 11.04.01]. The main SEE research areas are: renewable energy development, impact assessment of renewable energy on the power system operation; energy management, new measurement instrument and systems, wireless sensor networks, industrial automation, application of big data analytics and machine learning. The students are encouraged to engage in SEE research activities, by joining research groups organized by academic staffs [EE 11.04.02]. Annually, the student research week is organized; the top research projects are awarded and selected to participate in inter-university conferences [EE 11.04.03][42]. Several undergraduate students have co-authored with their lecturers in domestic and international papers [EE 11.04.04].

The students also assist the research support activities of academic staffs. The students have had a considerable contribution to the growing number of publications from SEE academic staffs in recent years [EE 11.04.05].

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

Feedback from staffs

Every month, SEE's board of director organize a meeting with the department heads. On a regular basis, these meetings serve as a feedback mechanism of SEE staffs. Besides, there is one meeting every year for all SEE staffs, where the yearly performance is reviewed, and plans for development are discussed openly.

Since 2017, all university lecturers, support staffs and students had licenses to use Office 365 programs. The university now uses Microsoft Team as another communication media where

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[41] Data of the Office of Student Affairs.

[42] See also 10.4

lecturers across different institutions of HUST can discuss with each other directly. Feedback to the HUST board of director is also possible.

Feedback from students

After the end of each year, SEE carries out surveys to get students' feedback regarding the curriculum, teaching facilities, support staff services [EE 11.05.01]. The Academic Office also performs independent surveys to students about the courses [EE 11.05.02]. The survey's results are then sent back to the SEE's board of director. If there is an issue of concern, the department and lecturer in charge will be notified. In general, the students are satisfied with the lectures, teaching methods, and facilities.

Feedback from alumni

Every year, the Office of Student Affaire surveys graduates of HUST regarding the program, income, work sectors. The survey results are sent back to HUST institution for analysis. Besides, SEE also performs its own survey on their alumni [EE 11.05.03]. The SEE survey results of alumni are shown in Figure 11-4.
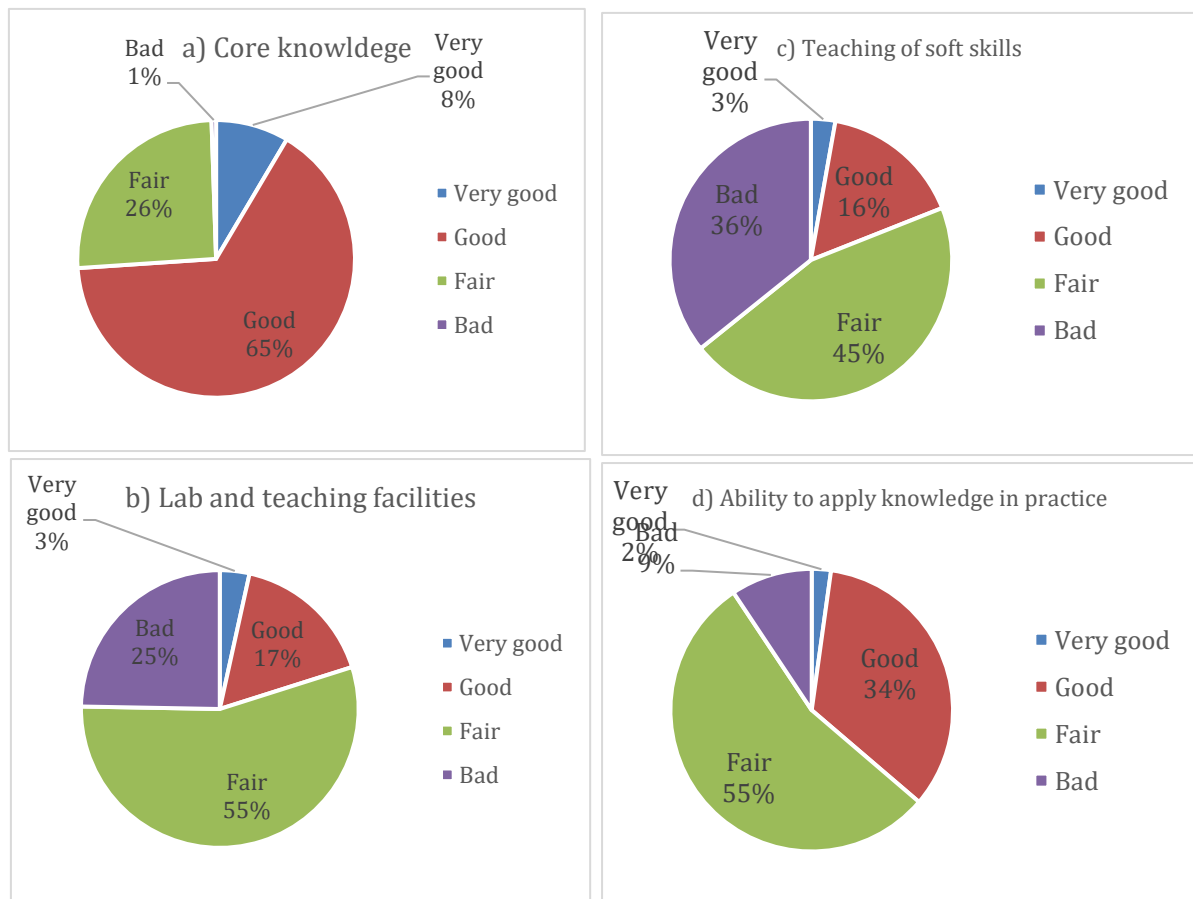
Figure 11-4 Summary of alumni survey (carried out by SEE in 2019).

Feedback from the employer

The collection of feedback data from entrepreneurs is carried out annually by the Office of Student Affairs. The School of Electrical Engineering also developed a separate collection system [EE 11.05.04]. The program has received positive feedback from the labor market. One obvious proof is that in recent years, employers anticipate the graduate semester (usually the Spring semester) and send job offers two to three months earlier [EE 11.05.05].

PART III   STRENGTH AND WEAKNESS ANALYSIS

1. Strength and weakness analysis

1.1   Criterion 1

Strength

- ELOs have been formulated and aligned with the vision and mission of HUST, meet the requirements of stakeholders
- ELOs was formulated based on the CDIO guidelines and was benchmarked with accredited programs
- ELOs cover both specific and generic learning outcomes and soft-skills

Weakness

- The survey system which gathers feedback from stakeholders has not been carried out frequently

Improvement plan

- Carry out the survey every year. The surveys should be sent to all relevant stakeholders

1.2   Criterion 2

Strength

- The information in the program is comprehensive and up-to-date. The course specification is comprehensive, up-to-date, several courses are compared with similar courses offered at other universities worldwide. Courses specification is standardized across the program

Weakness

- The process of reviewing the courses specification still needs improvement

Improvement plan

- SEE board of director and department head should consult with the Academic Office, the Office of Student Affairs for a process of gathering survey data, analyzing results and organizing meetings to review the specifications of the course

1.3   Criterion 3

Strength:

- Contents of the program reflect the learning outcome
- There is a coherence between knowledge blocks. The program contains a balanced mix between general and specialized courses
- The program is kept up-to-date,

Weakness

- The program should be structured more flexibly, which allows the learner to choose more optional modules that suit their specific needs. This difficulty has been recognized by power engineering educators worldwide. The new program curriculum in Power Engineering needs to strike a balance between specialized courses, which are

very typical in power engineering programs, and more general courses for students who require broad and interdisciplinary contents[43].

Improvement plan

- Revise the program curriculum, which offers more optional modules. Create new modules that reflect the most recent development in the industry, especially in the power and energy sector.

1.4   Criterion 4

Strength

- The educational philosophy is well articulated among staff members and students
- The teaching and learning methods are aligned with the ELOs
- Technologies are being used to assist the classroom activities

Weakness

- The active learning strategy should make up a more substantial part of the teaching activity

Improvement plan

- Encourage academic staffs to develop new approaches to teaching, especially those involves active learning. The student should be engaged in the lab and research activities in higher quantities.

1.5   Criterion 5

Strength

- The assessment is done on new students, and also on exit students
- The grading system and marking criteria are clear
- Regulations covering student absence, and other circumstances are clear
- The administrative verification system is in place to ensure the effectiveness of the procedures
- Students have easy access to the appeal procedures

Weakness

- Lecturers have not really applied a wide range of assessment methods

Improvement plan

- Informing and suggesting lecturers about new rubrics

1.6   Criterion 6

Strength

- SEE has a high-quality teaching and research staffs.

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[43] G. Chicco, *The Role of the Electrical (Power) Engineers in the Future Energy Systems*, 3rd UNI-SET Energy Clustering Event Universities in the Energy Transition: Focus on Smart Energy Systems and Communities, https://eua.eu/component/attachments/attachments.html?task=attachment&id=1582

- Monitoring of staff academic performance and rewarding policies are in place to encourage staff self-improvement
- Lecturers have opportunities to improve teaching skills and have access to short-term courses periodically

Weakness

- The amount of research grant is still limited
- The teaching load needs to be assigned more reasonably between staffs
- The credit-based system makes it very difficult to accurately plan the teaching load

Improvement plant

- Increase the support to motivate lecturer's scientific research. Expanding the collaboration network and get more funding opportunities
- Develop an efficient process of teaching load planning and assignment. Some of them have already been deployed since 2019

1.7   Criterion 7

Strength

- The support staffs are very responsible
- SEE and HUST create a good working environment for all academic and support staffs
- Support staffs can attend short-courses to improve them self

Weakness

- Most support staffs have limited English skills
- Load assignment to support staff is still not optimal. There is some unbalance in support staffs workload

Improvement plan

- Offer short courses for staffs to improve English skills
- Develop a more efficient process of teaching and lab work assignment

1.8   Criterion 8

Strength

- Student intake policies clearly defined
- There is an adequate monitoring system. The School actively monitor students' progress, assist students in improving their academic performance
- Students have easy access to the study plan, time table, and support services

Weakness

- Many students suffer a dip in academic performance during their first two university years. Some of them had very high entrance scores
- Students' English proficiencies, writing skills are in general, not up to the requirement of the modern workplace

Improvement plan

- Improve the communication to first-year students about university study

- Engage more teaching materials (books, references) in foreign languages
- Have courses that focus on developing writing skills (already implemented since promotion K62)

1.9 Criterion 9

Strength

- Teaching facilities are adequate and modern
- Laboratories are adequate and support education and research
- SEE departments receive considerable support from the industry in recent years.

Weakness

- The number of students having regular access to laboratories and research labs still need to be improved
- The use of software in student project courses should be increased

Improvement plan

- Revise course contents to engage the student in using lab equipment and simulation software (especially in power engineering major)
- Enhancing the connection with industrial partners, consider sending students to outside companies for doing certain experiments

1.10 Criterion 10

Strength

- Quality assurance system and procedures are uniform
- Roles of stakeholders in the curriculum design considered through the surveying systems

Weakness

- The survey system to get feedback from stakeholders needs to be improved. The surveys need to be carried out more frequently
- Certain involved stakeholders do not understand well the requirements and concept of curriculum development. The program outcomes need to be expressed in a more clear and concise manner for those who are not actively involved in the education job

Improvement plan

- Improve the survey systems to get feedback more systematically

1.11 Criterion 11

Strength

- Pass rates and dropout rates are monitored. Emerging issues are promptly identified and communicated to teaching staffs, departments and School Advisory Board
- Average time to graduation is monitored. Reasons for or delayed graduation are explained
- SEE constantly takes feedback from relevant stakeholders. In general students, alumni and employers are satisfied

- Survey results are consistent, for examples, all relevant stakeholders emphasized the need for more internship and experimental work.

Weakness

- There is currently no effective measure to enhance the student English skill which is a major reason for delayed graduation. New changes in the program that SEE implemented still need 3-4 years to evaluate results

Improvement plan

- Actively monitor student performance, study the effect of different measures in improving the graduation time, and reduce the dropout rate.

2. Self-assessment checklist

Table 2-1. Self-assessment checklist.

		1	2	3	4	5	6	7
1	**Expected Learning Outcomes**							
1.1	The expected learning outcomes have been clearly formulated and aligned with the vision and mission of the university						6	
1.2	The expected learning outcomes cover both subject specific and generic (i.e. transferable) learning outcomes						6	
1.3	The expected learning outcomes clearly reflect the requirements of the stakeholders						6	
2	**Programme specification**							
2.1	The information in the programme specification is comprehensive and up-to-date						6	
2.2	The information in the course specification is comprehensive and up-to-date						6	
2.3	The programme and course specifications are communicated and made available to the stakeholders.					5		
3	**Programme Structure and Content**							
3.1	The curriculum is designed based on constructive alignment with the expected learning outcomes					5		
3.2	The contribution made by each course to achieve the expected learning outcomes is clear.						6	
3.3	The curriculum is logically structured, sequenced, integrated and up-to-date					5		
4	**Teaching and Learning Approach**							
4.1	The educational philosophy is well articulated and communicated to all stakeholders						6	
4.2	Teaching and learning activities are constructively aligned to the achievement of the expected learning outcomes						6	
4.3	Teaching and learning activities enhance life-long learning						6	
5	**Student Assessment**							
5.1	The student assessment is constructively aligned to the achievement of the expected learning outcomes					5		

		1	2	3	4	5	6	7
5.2	Student assessment is constructively aligned to the achievement of the expected learning outcomes					5		
5.3	Methods including assessment rubrics and marking schemes are used to ensure validity, reliability and fairness of student assessment						6	
5.4	Feedback of student assessment is timely and helps to improve learning						6	
5.5	Students have ready access to appeal procedure						6	
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					5		
6.2	Staff-to-student ratio and workload are measured and monitored to improve the quality of education, research and service						6	
6.3	Recruitment and selection criteria including ethics and academic freedom for appointment, deployment and promotion are determined and communicated					5		
6.4	Competences of academic staff are identified and evaluated						6	
6.5	Training and developmental needs of academic staff are identified and activities are implemented to fulfil them						6	
6.6	Performance management including rewards and recognition is implemented to motivate and support education, research and service						6	
6.7	The types and quantity of research activities by academic staff are established, monitored and benchmarked for improvement						6	
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					5		
7.2	Recruitment and selection criteria for appointment, deployment and promotion are determined and communicated					5		
7.3	Competences of support staff are identified and evaluated						6	
7.4	Training and developmental needs of support staff are identified and activities are implemented to fulfil them						6	
7.5	Performance management including rewards and recognition is implemented to motivate and support education, research and service					5		
8	**Student Quality and Support**							
8.1	The student intake policy and admission criteria are defined, communicated, published and up to date						6	

No.								
8.2	The methods and criteria for the selection of students are determined and evaluated							6	
8.3	There is an adequate monitoring system for student progress, academic performance, and workload							6	
8.4	Academic advice, co-curricular activities, student competition, and other student support services are available to improve learning and employability							6	
8.5	The physical, social and psychological environment is conducive for education and research as well as personal well being							6	
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						5		
9.2	The library						5		
9.3	The laboratories and equipment are adequate and updated to support education and research						5		
9.4	The IT facilities including e-learning infrastructure are adequate and updated to support education and research						5		
9.5	The standards for environment, health and safety; and access for people with special needs are defined and implemented						5		
10	**Quality enhancement**								
10.1	Stakeholder's needs and feedback serve as input to curriculum design and development						5		
10.2	The ciriculum design and development process is established and subjected to evaluation and enhancement						5		
10.3	The teaching and learning processes and student assessment are continuously reviewed and evaluated to ensure their relevance and alignment							6	
10.4	Research output is used to enhance teaching and learning							6	
10.5	Quality of support services and facilities (at the library, laboratory, IT facility and student services) is subjected to evaluation and enhancement.						5		
10.6	The stakeholder's feedback mechanisms are systematic and subjected to evaluation and enhancement						5		
11	**Output**								
11.1	The pass rates and dropout rates are established, monitored and benchmarked for improvement							6	

11.2	The average time to graduate is established, monitored and benchmarked for improvement						6	
11.3	Employability of graduates is established, monitored and benchmarked for improvement						6	
11.4	The types and quantity of research activities by students are established, monitored and benchmarked for improvement						6	
11.5	The satisfaction levels of stakeholders are established, monitored and benchmarked for improvement						6	

PART IV   LIST OF EVIDENCE

00	INTRODUCTION
EE 00.01	Decision to establish HUST
EE 00.02	Decision to make HUST an autonomous institution
EE 00.03	Decision to establish the Faculty of Energy (former name of SEE)
EE 00.04	List of undergraduate programs
EE 00.05	Master programs offered at HUST
EE 00.06	Ph.D. programs at HUST
EE 00.07	Decision to establish SAR team for the EE program
01	**EXPECTED LEARNING OUTCOMES**
01.01 The expected learning outcomes have been clearly formulated and aligned with the vision and mission of the University	
EE 01.01.01	HUST vision and mission
EE 01.01.02	Expected Learning Outcomes – EE program
EE 01.01.03	The decision of establishment of the Curriculum Design Committee in Electrical Engineering
EE 01.01.04	Guide to the development of Program Curriculum according to the CDIO guidelines
01.02 The expected learning outcomes cover both generic and specific subject	
EE 01.02.01	Guide to the CDIO based program curriculum development – issued by HUST academic Office
EE 01.02.02	Law on higher education
EE 01.02.03	MOET's regulation on the credit-based education program
EE 01.02.04	HUST regulation on the credit-based education program
EE 01.02.05	Skill matrix
01.03 The expected outcomes clearly reflect the requirements of the stakeholders	
EE 01.03.01	Employer survey form
EE 01.03.02	Alumni survey form
EE 01.03.03	Student surveys (about the education programs)
EE 01.03.04	Lecturer's survey
EE 01.03.05	Invitation letter to attend the workshop on ELOs
EE 01.03.06	Minutes of meeting with industry partners, 2017
EE 01.03.07	Meeting activities between prospective employers and students
02	**PROGRAM SPECIFICATION**
02.01 Information in the programme specification is comprehensive and up-to-date	
EE 02.01.01	Student guide book

EE 02.01.02	The Program curriculum in Electrical Engineering
EE 02.01.03	An international program in EE (Tsinghua university)
EE 02.01.04	Results of survey for US and Canada universities about the education program in power engineering
EE 02.01.05	Reports of the Curriculum Design Committee on the power engineering programs offered worldwide.

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

EE 02.02.01	Detailed course description
EE 02.02.02	Changes to the program curriculum
EE 02.02.03	Survey form by the Academic Office
EE 02.02.04	Process of modification of the program curriculum

02.03 The program and course specifications are communicated and made available to the stakeholders

EE 02.03.01	Flyer introducing EE program
EE 02.03.02	Website to the EE program (see.hust)
EE 02.03.03	Academic Office web portal
EE 02.03.04	The Electrical Engineering Program specification
EE 02.03.05	The program of student week
EE 02.03.06	Emails between Academic advisory and students

03	**PROGRAM STRUCTURE AND CONTENT**

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

EE 03.01.01	Skill matrix
EE 03.01.02	List of courses that require experimental activities
EE 03.01.03	Course specification – Introduction to Electrical Engineering (EE1024)

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

EE 03.02.01	Skill matrix
EE 03.02.02	Standard study plan in EE – Power engineering Major
EE 03.02.03	Revised program in EE
EE 03.02.04	Academic Office guide to writing the course description

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

EE 03.03.01	Program curriculum EE
EE 03.03.02	Decision on the establishment of the Curriculum Design Committee
EE 03.03.03	New program in EE

EE 03.03.04	Minutes of meetings of the Curriculum Design Committee since 2017

04	**TEACHING AND LEARNING APPROACH**

04.01 The educational philosophy is well articulated and communicated to all stakeholders

EE 04.01.01	Webpage of SEE
EE 04.01.02	Introduction of SEE (present to students in the student meeting event)
EE 04.01.03	Activities in the student week (beginning of semester)

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

EE 04.02.01	List of courses having experimental activities
EE 04.02.02	Assessment methods for courses in EE and CEA programs
EE 04.02.03	Slides – Introduction to Electrical Engineering
EE 04.02.04	Course material – Power system experiment II
EE 04.02.05	Examples of course webpages
EE 04.02.06	Technical internship report
EE 04.02.07	Graduate internship report
EE 04.02.08	MOU between EVNHNPC (power company) and SEE
EE 04.02.09	Project 1 – Question and report
EE 04.02.10	Project 2 – Question and report
EE 04.02.11	Project 3 – Question and report

04.03 Teaching and learning activities enhance life-long learning

EE 04.03.01	Notice of the Week of student research
EE 04.03.02	Student research prizes photos
EE 04.03.03	Slides of EE student research (2018)
EE 04.03.04	Scientific papers with students as co-author
EE 04.03.05	Lists of EE alumni pursuing graduate study at SEE

05	**STUDENT ASSESSMENT**

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

EE 05.01.01	University entrance exam webpage
EE 05.01.02	Entrance score of SEE in recent years
EE 05.01.03	Example of exam question and scoresheets
EE 05.01.04	HUST regulation of the university education
EE 05.01.05	Template documents for the establishment of the graduate defense jury, assessment rules.

EE 05.01.06	A final thesis

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

EE 05.02.01	HUST regulation of the exam surveillance and assessment
EE 05.02.02	Academic Office guide to the semester important timeline
EE 05.02.03	Academic office webpage
EE 05.02.04	Academic office Facebook page
EE 05.02.05	Detailed course specification
EE 05.02.06	Student access to course evaluation results
EE 05.02.07	Academic transcript

05.03 Study assessment methods are variety, ensure validity, reliability and fairness

EE 05.03.01	Regulations on University Education
EE 05.03.02	Regulation on the summative and formative assessment procedures
EE 05.03.03	List of courses (in EE) and assessment method
EE 05.03.04	Sample of Detailed Syllabus
EE 05.03.05	Example of exam questions, answer and scoresheet
EE 05.03.06	Academic office survey results (raw data and analysis)
EE 05.03.07	Students survey form prepared by SEE (results)

05.04 Feedback of student assessment is timely and helps to improve learning

EE 05.04.01	Regulation on the students' mark submission
EE 05.04.02	Student's marks webpage
EE 05.04.03	Survey form of the Academic Office
EE 05.04.04	Lecturers' guide to the online note submission

05.05 Student have ready access to appeal procedure

EE 05.05.01	Regulation on the University education
EE 05.05.02	Example of appeal form
EE 05.05.03	Survey results of students (2019)

06	**ACADEMIC STAFF QUALITY**

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

EE 06.01.01	List of SEE teaching staffs (degree)
EE 06.01.02	List of SEE's invited lecturers
EE 06.01.03	Process of teaching load assignment

EE 06.01.04	List of retired teaching staffs in the coming years
EE 06.01.05	Employment decision of recent teaching staffs
EE 06.01.06	Regulations on the University research grant
EE 06.01.07	List of young Ph.D. lecturers having obtained University research grants
EE 06.01.08	Associate Professor and Professor of SEE, their ages

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

EE 06.02.01	Report of SEE staffs general meeting in recent years
EE 06.02.02	Regulation on staff management
EE 06.02.03	Teaching load statistics of SEE in recent years
EE 06.02.04	FTEs statistics in 5 years
EE 06.02.05	Statistics of teaching load in 05 years

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

EE 06.03.01	Procedures for staff employment (HUST)
EE 06.03.02	Regulation on Staff management
EE 06.03.03	Notices of job vacancy
EE 06.03.04	Academic profiles of new recruited lecturers

06.04 Competences of academic staff are identified and evaluated

EE 06.04.01	Survey of students about courses
EE 06.04.02	Notice of informed/non-informed class evaluation session
EE 06.04.03	Regulation on the class evaluation process
EE 06.04.04	Lecturer evaluation form
EE 06.04.05	Scientific workload in recent years
EE 06.04.06	HUST internal spending regulation
EE 06.04.07	List of Academic Advisory board members and class managers
EE 06.04.08	Regulations on the duty of Academic Advisory board

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

EE 06.05.01	Notice of scholarship and research funds
EE 06.05.02	List of staff participating in the pedagogical courses
EE 06.05.03	Information of the Hitachi Foundation Fund
EE 06.05.04	Training of nuclear power technology
EE 06.05.05	Invitation letter from MOIT regarding Energy planning

06.06 Performance management including rewards and recognition is implemented to motivate and support education, research and service	
EE 06.06.01	HUST guide to the staffs assessment procedure
EE 06.06.02	Notice of before-term salary increase
EE 06.06.03	List of staff getting "Outstanding staff" awards
EE 06.06.04	Guides to the procedures of applying for People's teacher award
EE 06.06.05	Minutes of meeting, "Outstanding faculy" titles
EE 06.06.06	HUST Internal regulation on spending rules, calculation of teaching and scientific work load
06.07 The types and quantity of research activities of academic staffs are established, monitored and benchmarked for improvement	
EE 06.07.01	Reports of the general meeting of SEE staffs
EE 06.07.02	IEEE - ICSET international conference
EE 06.07.03	RCEE international conferences
EE 06.07.04	SCI papers from SEE in recent years
07 **Support staff quality**	
07.01 Support staff planning (at the library, laboratory, IT facility and student service) is carried out to fulfill the needs for education, research and service	
EE 07.01.01	Rector's decision on the responsibility of HUST offices and centers
EE 07.01.02	Library
EE 07.01.03	HUST support staffs
EE 07.01.04	SEE office staffs' responsibilities
EE 07.01.05	Support staffs of SEE
EE 07.01.06	List of support staff transferred to teaching staff
07.02 Recruitment and selection criteria for appointment, deployment and promotion are determined and communicated	
EE 07.02.01	Law on Public Employees
EE 07.02.02	Ordinance 29/12/NĐ-CP
EE 07.02.03	Notice of job vacancy
EE 07.02.04	HUST development plan 2025
EE 07.02.05	Report of the General staffs meeting - HUST
07.03 Competences of support staff are identified and evaluated	
EE 07.03.01	Notice of job vacancy for teaching staffs
EE 07.03.02	Documents of apprenticeship for teaching staffs
EE 07.03.03	Staff classification reports

EE 07.03.04	Internal spending rules
EE 07.03.05	Survey forms for students
EE 07.03.06	Teaching staff evaluation
07.04 Training and developmental needs of support staff are identified and activities are implemented to fulfil them	
EE 07.04.01	Decision to send teaching staffs aboard (Tran Thanh Son)
EE 07.04.02	Office 365 teaching materials
EE 07.04.03	Academic web portal teaching materials
EE 07.04.04	Teaching material for librarian
07.05 Performance management including rewards and recognition is implemented to motivate and support education, research and service	
EE 07.05.01	Annual staff assessment procedures
EE 07.05.02	List of rewards and recognition in recent years
EE 07.05.03	Decision on "before-term" salary increase for support staffs
08	**STUDENT QUALITY AND SUPPORT**
08.01 The student intake policy and admission criteria are defined, communicated, published, and up-to-date	
EE 08.01.01	HUST webpage of student admission information
EE 08.01.02	Names and number of admissions for each program of HUST
EE 08.01.03	Entry score of different programs
EE 08.01.04	Minutes of meeting between SEE's board of Director and the departments regarding the Entrance quota
08.02 Methods and criteria for the selection of students are determined and evaluated	
EE 08.02.01	HUST admission webpage
EE 08.02.02	Admission quota page
EE 08.02.03	Entry scores information on HUST website
EE 08.02.04	Entry scores information on online newspapers
08.03 There is an adequate monitoring system for student progress, academic performance and workload	
EE 08.03.01	HUST regulation on Education and Training
EE 08.03.02	Information on scholarship programs
EE 08.03.03	Student web portal (sis.hust.edu.vn)
EE 08.03.04	Academic Office web portal
EE 08.03.05	Example of student academic result on the web

EE 08.03.06	Minutes meeting of SEE board of directors with the Departments, discussing student results
EE 08.03.07	List of SEE students, their CPA, and accumulated credits
EE 08.03.08	Email to student regarding graduate programs
EE 08.03.09	SEE fan page
EE 08.03.10	Snapshot of the Academic Advisory Board mailbox

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

EE 08.04.01	A student's personal time table
EE 08.04.02	List of Academic Advisory board members, activities
EE 08.04.03	Emails regarding class registration, lecturer assignment
EE 08.04.04	Notice of the Student week activity
EE 08.04.05	Link for gathering course registration requests
EE 08.04.06	Email to students about lecturers assignment
EE 08.04.07	SEE lab tour activity
EE 08.04.08	Activities of the Ho chi Minh Communist Youth Union
EE 08.04.09	Cooperation activity with Tabuchi
EE 08.04.10	MOU with EVN, EVNHNPC
EE 08.04.11	Letter of introduction to prospective employers

08.05 The psychological environment, society and landscape facilitates the training, research and comfort for individual learners

EE 08.05.01	List of students participating in research labs
EE 08.05.02	Maps of HUST campus showing the swimming pool, sports complex, football stadium
EE 08.05.03	Students' voluntary works
EE 08.05.04	Slides used in the Student meeting week
EE 08.05.05	Job vacancy announcements via SEE and its department fan pages (A0, A1, NPC, Siemens, Toshiba)

09	**FACILITIES AND INFRASTRUCTURE**

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

EE 09.01.01	List of classroom
EE 09.01.02	Photos of classrooms, self-study room
EE 09.01.03	Survey results about classroom facilities

09.02 The library and its sources are adequate and updated to support education and research

EE 09.02.01	Library layout
EE 09.02.02	Library database
EE 09.02.03	Guide to the using the library
EE 09.02.04	Notice of adding references to the library
EE 09.02.05	Request of adding new library references

09.03 The laboratories and equipment are adequate and updated to support education and research

EE 09.03.01	List of experimental labs, SEE
EE 09.03.02	List of laboratories of SAHEP project
EE 09.03.03	MOU with ETAP
EE 09.03.04	The ceremony of reception of power system automation testbed (courtesy of Vengy)
EE 09.03.05	ETAP notice of sponsor
EE 09.03.06	Notice of sponsorship, Electricity of Vietnam

09.04 Information systems (including online learning infrastructure) are adequate and up-to-date to support training and research activities

EE 09.04.01	Multi-media lab
EE 09.04.02	Office 365
EE 09.04.03	QLDT web interface

09.05 Environmental, health and safety standards are identified and implemented taking into account the specific needs of the disabled

EE 09.05.01	Introduction to the Medical Center
EE 09.05.02	Notice of annual health check for HUST staffs
EE 09.05.03	Notice regarding the prevention of epidemics, sanitation activities
EE 09.05.04	Images of D2A cafeteria

10	QUALITY ENHANCEMENT

10.01 Stakeholder's needs and feedback serve as input to curriculum design and development

EE 10.01.01	SEE's procedure for processing feedback from relevant stakeholders
EE 10.01.02	Summary of students feedback
EE 10.01.03	General staff meeting report 2016, 2017, 2018
EE 10.01.04	Survey results for alumni
EE 10.01.05	Survey from - Industry
EE 10.01.06	Decision on the establishment of the Curriculum Design Committee (2017)

10.02	**The curriculum design and development process is established and subjected to evaluation and enhancement**
EE 10.02.01	Minutes of the meetings of the Curriculum Design Committee (since 2017)
EE 10.02.02	Minutes of meeting with industry partners (on the ELOs)
EE 10.02.03	SEE's program curricula on website
10.03 The teaching and learning processes and student assessment are continuously reviewed evaluated to ensure their relevance and alignment	
EE 10.03.01	Regulation of the University Education
EE 10.03.02	Survey results (Academic Office)
EE 10.03.03	Survey form (alumni)
EE 10.03.04	Alumni survey results (SEE)
EE 10.03.05	Assessment form, Quality Assurance Office
EE 10.03.06	Minutes of meeting of SEE's departments
10.04	**Research output is used to enhance teaching and learning**
EE 10.04.01	List of SEE students participating in research labs
EE 10.04.02	List of student research topics
EE 10.04.03	SEE lab tour activity
EE 10.04.04	Proceeding of student research works (2016)
10.05 Quality of support services and facilities (at the library, laboratory, IT facility and student services) is subjected to evaluation and enhancement	
EE 10.05.01	Survey form about the library, IT facilities
EE 10.05.02	List of equipment in laboratories of SEE
EE 10.05.03	The World Bank documents on the SAHEP project
EE 10.05.04 SAHEP labs	SEE-HUST decision on the formulation of design and assessment team for
10.06 The stakeholder's feedback mechanisms are systematic and subjected to evaluation and enhancement	
EE 10.06.01	Academic Office survey form
EE 10.06.02	Survey question (by SEE) of new graduate students
11	**OUTPUT**
11.01 The pass rates and dropout rates are established, monitored and benchmarked for quality improvement	
EE 11.01.01	Number of graduates
EE 11.01.02	Statistics of dropout
EE 11.01.03	SEE internal report on students' academic performance

EE 11.01.04 A minute of meeting between Vice-Rector, Academic Office and SEE Vice Dean, which discuss methods to help students on warning level 3 (translated to English)	

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

EE 11.02.01   SEE's student academic performance (raw data)
EE 11.02.02   Academic transcript of students on warning level 3
EE 11.02.03   SEE minutes of meeting discussing student performance, improvement solutions

11.03 Employability of graduates is established, monitored and benchmarked for improvement

EE 11.03.01   Survey of income of new graduate students
EE 11.03.02   Survey results (by SEE) of new graduate students
EE 11.03.03   Survey carried out in 2018 for alumni (graduated in 2017) by the Office of Student Affairs (translated)

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

EE 11.04.01   SEE's annual research report and plan
EE 11.04.02   List of research groups in Electrical Engineering, SEE
EE 11.04.03   Student research competition
EE 11.04.04   Student research papers
EE 11.04.05   List of publications from SEE academic staffs in recent years

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

EE 11.05.01   Survey form on the satisfaction level of students
EE 11.05.02   Student survey results
EE 11.05.03   Alumni survey
EE 11.05.04   Prospective employer survey
EE 11.05.05   Recent offers received by SEE for EE students