ASIIN Seal

Accreditation Report

Bachelor's Degree Programme
Mathematics
Physics
Electronics & Telecommunications Engineering

Provided by
Vietnam National University Ho Chi Minh City
University of Science

Version: April 5th, 2024

Table of Content

A About the Accreditation Process

Name of the degree programme (in original language)	(Official) English translation of the name	Labels applied for [1]	Previous accreditation (issuing agency, validity)	Involved Technical Committees (TC)[2]
Toán học	Mathematics	ASIIN	-	12
Vật lý	Physics	ASIIN	-	13
Kỹ thuật điện tử và viễn thông	Electronics and Telecommunications Engineering	ASIIN	-	02
Date of the contract: 22.11.2021 **Submission of the final version of the self-assessment report:** 27.07.2022 **Date of the onsite visit:** 11. – 12.01.2023 **at:** VNUHCM University of Science Campus District 5				
Peer panel: Prof. Dr. Volker Bach, Technische Universität Braunschweig Prof. Dr. Madhukar Chandra, Chemnitz University of Technology Prof. Dr. Barbara Hahn, University of Applied Sciences Koblenz Prof. Dr. Nhut Huynh Hoàng, University of Technology – Vietnam National University, Ho Chi Minh Prof. Dr. Ngo Quoc Anh, University of Science – Vietnam National University, Ha Noi Dr. Nguyen Dinh Uyen, International University – Vietnam National University, Ho Chi Minh City				

[1] ASIIN Seal for degree programmes

[2] TC: Technical Committee for the following subject areas: TC 02 - Electrical Engineering/Information Technology; TC 12 - Mathematics; TC 13 - Physics.

Mr. Nguyen Xuan Viet Duc, student at University of Information Technology – Vietnam National University, Ho Chi Minh City	
Representative of the ASIIN headquarter: Dr. Andrea Kern	
Responsible decision-making committee: Accreditation Commission for Degree Programmes	
Criteria used: European Standards and Guidelines as of May 15, 2015 ASIIN General Criteria, as of December 10, 2015 Subject-Specific Criteria of Technical Committee 12 – Mathematics as of December 9, 2016 Subject-Specific Criteria of Technical Committee 13 – Physics as of March 20, 2020 Subject-Specific Criteria of Technical Committee 02 – Electrical Engineering/Information Technology as of December 9, 2011	

B Characteristics of the Degree Programmes

a) Name	Final degree (original/English translation)	b) Areas of Specialization	c) Corresponding level of the EQF[3]	d) Mode of Study	e) Double/Joint Degree	f) Duration	g) Credit points/unit	h) Intake rhythm & First time of offer
Mathematics	Cử nhân/ B.Sc.		6	Full time	-	8 Semester	131 CP	Annually, August 1947
Physics	Cử nhân/ B.Sc.		6	Full time	-	8 Semester	126-132 CP	Annually, August 1947
Electronics and Telecommunications Engineering	Cử nhân/ B.Sc		6	Full time	-	8 Semester	131 CP	Annually, August 2005

The Vietnamese National University Ho Chi Minh City University of Science (VNUHCM-US) is a higher education institution (HEI) based in Ho Chi Minh City. The university was founded as a division of the Indochina College of Science in 1941 and was integrated into the Vietnamese National University Ho Chi Minh City in 1996. VNUHCM-US is a public university providing education focusing nowadays on basic and applied sciences. The university submitted their self-assessment report (SAR) to review three bachelor degree programmes.

For the Bachelor's degree programme *Mathematics*, the institution has presented the following profile in their application:

"Precursor of the faculty as a department has offered bachelor's degrees in mathematics since the 1960s. By the early 1990s, it had established the master's programme and PhD programme in mathematics. Around 1996 the department became the Faculty of Mathematics and Computer Science. As of December 2019 the Faculty has 951 undergraduate majors, 179 master students, and 47 PhD students. The faculty is offering comprehensive mathematical education, with expertise in a wide range of areas of mathematics and its applications, contributing to society at local, national, and international levels.

[3] EQF = The European Qualifications Framework for lifelong learning

Vision: The Faculty of Mathematics and Computer Science serves as a centre of mathematics education and research in Vietnam.

Mission: The Faculty of Mathematics and Computer Science aims to cover fundamental knowledge of mathematics conducive to expertise in the subject matter and its applications."

For the Bachelor's degree programme *Physics*, the institution has presented the following profile in their application:

"Faculty of Physics and Engineering Physics was established from the University's founding days in 1956 and is one of the oldest faculties of the University. Currently, the Faculty of Physics and Engineering Physics has four undergraduate programmes, including the Physics Programme, the Oceanography Programme, the Nuclear Engineering Programme, and the Medical Physics Programme.

The Faculty of Physics and Engineering Physics has four general laboratories, eight specialized laboratories, and one high-tech laboratory. Every year, the faculty enrols about 150-200 freshman students and has about 80-100 graduates

The task of the faculty is to provide undergraduate and graduate students with solid, state-of-the-art knowledge of physics and engineering physics, as well as the necessary skills for practice and research. Students have logical and creative thinking methods to apply scientific and technological achievements to solve real-life problems. Students are also equipped to become scientists, teachers, and experts who work in different sectors of society.

Vision: To become a strong training and research centre in the field of physics, engineering physics in Vietnam, comparable to prestigious centres in the region and the world.

Mission: Training of undergraduates, postgraduates, scientific research, and technology transfer in the fields of physics and engineering physics; creating quintessential products to meet the increasing socio-economic development requirements of Vietnam and in line

with the international development trend; integrating with advanced higher education in the region and the world."

For the Bachelor's degree programme *Electronics & Telecommunications Engineering*, the institution has presented the following profile in their application:

"The Faculty of Electronics and Telecommunications was established by the President of Vietnam National University Ho Chi Minh City on June 19, 2006. In fact, the Faculty can be considered to have started from about 1956 - 1958 with the name of Department of Electronics at Faculty of Science, the University of Saigon. In early 2005, VNUHCM allowed the establishment of Electronics - Telecommunications major. In June 2006, Faculty of Electronics and Telecommunications was established officially.

Vision: The Faculty of Electronics and Telecommunications aims to become a strong domestic training and scientific research unit with a high position in the region in the field of electronics - telecommunications.

Mission: The Faculty of Telecommunications is responsible for undergraduate and graduate training, providing high-quality electronic - telecommunications human resources; is a place to carry out scientific researches to meet the requirements of socio-economic development of Vietnam and the trend of the world."

C Peer Report for the ASIIN Seal[4]

1. The Degree Programme: Concept, content & implementation

Criterion 1.1 Objectives and learning outcomes of a degree programme (intended qualifications profile)

Evidence:

- Self-assessment report
- Objective-module matrix of each study programme
- Learning outcomes of each study programme
- Web page VNUHCM-US https://www.hcmus.edu.vn/
- Web page programme Mathematics https://math.hcmus.edu.vn/en/
- Web page programme Physics https://phys.hcmus.edu.vn/
- Web page programme Electronics & Telecommunications Engineering http://www.fetel.hcmus.edu.vn/en/electronics/
- Diploma and diploma supplement
- Discussion during the audit

Preliminary assessment and analysis of the peers:

VNUHCM-US describes in their self-assessment report (SAR) that each faculty establishes a Science and Academic Committee to manage one study programme. The Scientific and Academic Council of the bachelor's programme *Mathematics*, and *Electronics and Telecommunications Engineering* (ETE) is responsible for developing the objectives and learning outcomes. Following an internal review, faculty members, administrators, colleagues, students, alumni and stakeholders are involved in the implementation of the learning outcomes in each programme. The intention is to develop programme content, which is in agreement with national and international guidelines while also reflecting the social needs and trends in the respected fields. This process follows the steps outlined below:

[4] This part of the report applies also for the assessment for the European subject-specific labels. After the conclusion of the procedure, the stated requirements and/or recommendations and the deadlines are equally valid for the ASIIN seal as well as for the sought subject-specific label.

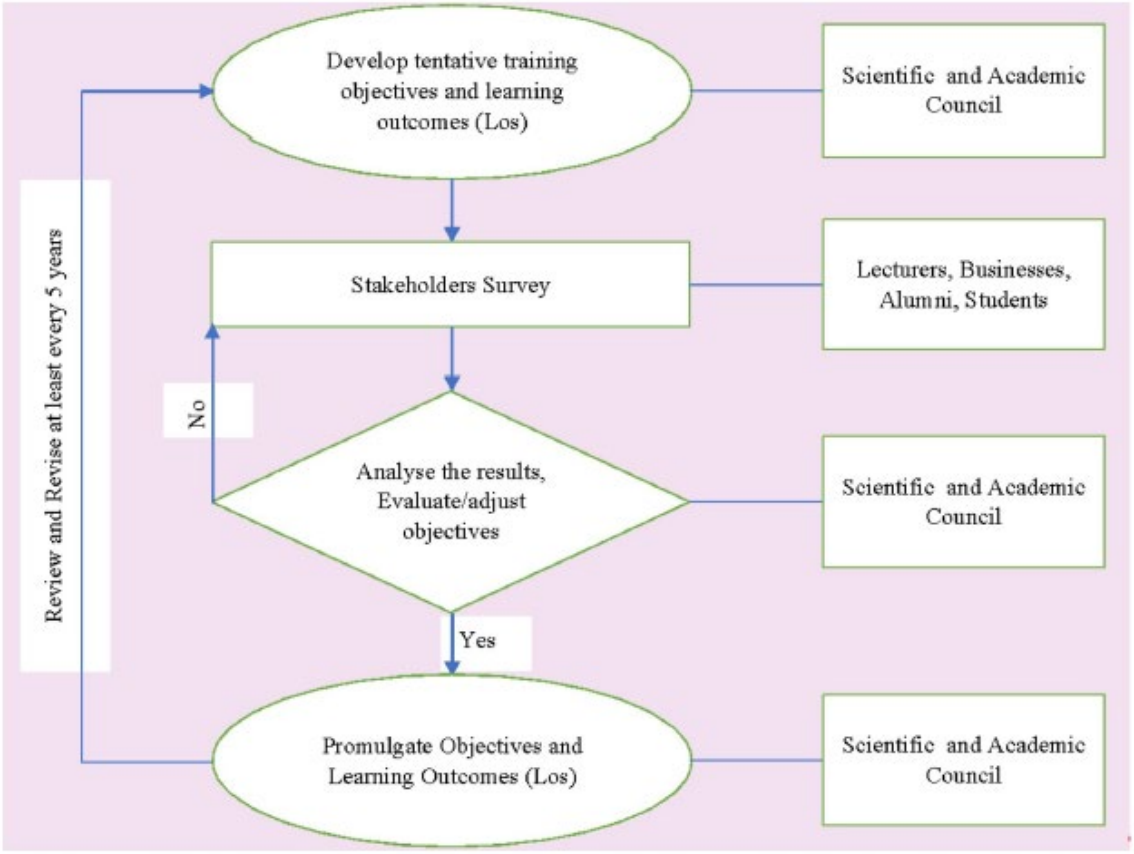

Figure 1.1. The process of developing, reviewing, and adjusting the objectives and intended learning outcomes of the study programme

The current structure of the bachelor's programme *Mathematics* was established in 2010, while the intended learning outcomes of the programme were stated in 2015. Regular updates take place annually with the last major changed implemented in 2019. The following required skills and abilities were defined as objectives for each student graduation from this programme:

1. Ability to summarize basic scientific and social knowledge and foundational mathematical knowledge.
2. Commanding fundamental knowledge of mathematics.
3. In-depth knowledge in a specialization.
4. Broad knowledge in certain related areas.
5. Precise and rigorous thinking, methods of scientific approach, flexible adaption of mathematical knowledge methods, and tools to solve practical problems.
6. Skills for independent works and group works, communication, self-learning, absorption of new knowledge, time and resource management, systematic consideration, proactive creative and cooperating spirits, social consciousness, and adaption.

These lead to the intended learning outcomes (ILO) summarized below

Label	Learning outcomes
ILO 1	General education: Ability to summarize and utilize general knowledge on politics, economics, society, natural sciences, learning skills, foreign languages, and health.
ILO 2	General professional education: Achievement of required competency in multivariable calculus, linear algebra, introductory algebraic structures, basic analysis on metric and normed spaces, solving concrete differential equations and mathematical models, introductory mathematical software, and introductory computer programming.
ILO 3	Foundational professional education: Achievement of required competency in at least one of the following Concentrations: Mathematics, Computer Science, Quantitative Finance, Mathematical Education, through required courses of the concentration.
ILO 4	Professional education: Achievement of in-depth knowledge through required and optional courses of at least one Specialization of the Concentration. Qualified students are allowed to take a seminar course and compose a graduation thesis.
ILO 5	Broad and auxiliary education: Completion of a mandatory number of courses outside of the Specialization and a minimum number of credits.
ILO 6	Computer skills: Ability to utilize to communicate, search, access information and study resources, able to compose mathematical texts in accordance with professional practice, command at least one programming language.
ILO 7	Professional communication skills: Experience in project writings and presentations.
ILO 8	Foreign language skill: Achievement of university's required competency in English language, able to utilize professional documentation in English, some students experienced professional classes studied in English.
ILO 9	Soft skills: Acquisition of skills, habits, and inner resources for self-study, social communication, group work. Participated in professional and extra-curricular activities.
ILO 10	Way of thinking: developed rigorous, precise, reflective thinking; independent and creative mind; social consciousness; realization of roles of mathematics and computer science in life; figuring one own place in society.

The bachelor's programme *Physics* issued the following objectives:

1. Science knowledge: Having a natural science, economics, society, and ideological politics; learners can grasp the characteristics of nature, economy, and society in practical contexts of science and life.
2. Knowledge in physics foundation and profession: Being able to analyse and solve problems related to their major, and research and apply in production practice, design, manufacture, process formulate, survey, evaluation, and solutions of specialized problems.
3. Professional skills: Being able to participate in moral qualities, personal and social skills, including independence, creativity, adapting to new environments, communication, and cooperation to work effectively and successfully in a modern working environment, serving the community.
4. International communication: Having skills in communication, teamwork, teamwork, and foreign language (English) to gain leadership positions in professional careers.

The objectives are aligned with the vision and mission of the bachelor's programme in *Physics*. The intended learning outcomes to support these objectives, which were developed by the faculty's scientific council, experts, lecturers, employers and alumni are as follows:

Label	**Learning outcomes**
ILO 1	Apply basic knowledge of natural science (math, chemistry, earth science, and informatics) and social science to support solving problems in physics.
ILO 2	Apply fundamental and in-depth knowledge of physics and mathematical formulation for theoretical analysis, modelling, and simulation of relevant processes.
ILO 3	Apply knowledge of one of the following majors: theoretical physics, nuclear physics, applied physics, solid-state physics, geophysics, physics and electronic engineering, physics, and computer science in order to solve problems in the field of physics and engineering physics.
ILO 4	Apply career skills for problem solving in physics and engineering physics, including skills such as logical thinking, scientific research, practice, design, and conducting experiments.
ILO 5	Apply personal skills such as communication skills, lifelong self-study skills, critical thinking skills, judgment, and decision-making skills.

ILO 6	Use specialized English terminology and information technology for scientific research and personal development.
ILO 7	Apply physics knowledge and experience to conceptualize, analyse and design new physical situations.
ILO 8	Understand organization, leadership, planning, teamwork, and effective communication in science and social interaction.
ILO 9	Analyse and evaluate experimental results, processes, methods, and research results in a specific discipline or interdisciplinary.
ILO 10	Understand the professional culture, professional ethics, professional responsibility, respect themselves, and colleagues, be honest, and community service.

VNUHCM-US states, that these learning outcomes allow the graduates from the bachelor's programme *Physics* to be adaptable and self-taught, which provides the graduates from this programme with the opportunity to work also outside the field of physics.

The bachelor's programme of *ETE* was developed since 2005. Since 2013, adjustments in the programme follow the approach Conception – Design – Implementation – Operation (CDIO). The Science and Academic Council created the current objectives based on a cooperation of stakeholders, senior students, alumni, lecturers and enterprises. The objectives of the study programme contain:

1. Core competency: Graduates have the ability to provide engineering solutions with a solid foundation of mathematics, science and technology, module domain knowledge for the field of Electronics & Telecommunications and allied disciplines.
2. Technical proficiency: Graduates are capable of combining theoretical and practical skills, applying the appropriate methodology, critical thinking and design techniques, and state-of-the-art technology to solve practical engineering problems in specific jobs, or higher education, scientific research, industrial research and development.
3. Cognitive skills: Graduates are capable of working independently as well as together in groups into a high-quality pressured environment, or working effectively in diverse and multidisciplinary tasks independently, developing and integrating into a high-quality job market.

4. Attitude and awareness: Graduates have a solid understanding of professional, ethical and responsibilities. Graduates also engage in continuing educational and/or professional, life-long learning.

The current intended learning outcomes reflect the objectives and consider the recommendation of the CDIO; they can be summarized in the following points:

Label	Learning outcomes
ILO 1	Understand and apply appropriate mathematics, physics and information technology to identify, formulate and solve electronic and telecommunication-related problems.
ILO 2	Identify ideas, analyse, practice and operate Electronics & Telecommunications systems in accordance with the contemporary development trend of the industry.
ILO 3	Design hardware, software, devices and products in the field of Electronics & Telecommunications for the global market.
ILO 4	Apply knowledge of Electronics & Telecommunications to identify, solve realistic problems and develop products.
ILO 5	Analyse and select appropriate models, techniques, tools and methods for relating given problems in the field of Electronics & Telecommunications.
ILO 6	Do research on technical literature and other extra sources of information, propose and select solutions, processes and tools to solve complex problems.
ILO 7	Apply new advances or findings in science and technology in solutions while taking into consideration the economic, ecological, technical and social requirements.
ILO 8	Present problems and solutions fluently for others by oral communication and writing technical reports.
ILO 9	Use English efficiently, comply with the standard of level 3/6 of the foreign language proficiency framework.
ILO 10	Conduct independent working, lifelong learning, critical and creative thinking, behave professionally and adapt to social development.

ILO 11	Engage in teamwork, leadership and management effectively; demonstrate an awareness of project management, business practices, risk and change management or even their limitations.
ILO 12	Demonstrate an awareness of the social needs, the health, safety, legal issues; commit to professional ethics, responsibilities and norms of engineering practice and its impact in a societal and environmental context

In the discussion with the representatives of the rector's office, the expert panel learns that the university was established 80 years ago as an institution to teach the fundamental basics in the fields of science. In recent years, the focus of the university shifted towards applications of science and technology, which lead to new programmes and courses in the established fields of science. This development allowed the university to integrate new trends in science, technology, and society, as well as, global challenges. The stakeholders from industry and the private sector state that they were contacted by the university to review the objectives and learning outcomes of the programmes under review. They advise VNUHCM-US on important topics in their respective field and consider their concerns and suggest improvements to the learning outcomes and the curricula. They conclude that they are quite satisfied with the qualifications of the graduates from the programmes in *Mathematics*, *Physics* and *ETE*.

The experts were also interested in which kind of professions graduates of each programme engage and where there are opportunities. The programme coordinators of the bachelor's programme Mathematics explain that a high percentage of their graduates join insurance companies while others join companies in need for applied mathematics including network companies (e.g., Facebook or Google), technological companies (e.g., Bosch) or hospitals (especially graduates with statistics specialization). Around 30% specialise in mathematics education and therefore continue to work at school or educational centres. Other graduates continue their studies, either at VNUHCM-US or at universities abroad (especially in Europe or Korea). Graduates from the bachelor's programme *Physics* have numerous job opportunities in Ho Chi Minh City. Many graduates find jobs within the Saigon Hi-tech Park while others join industrial companies (especially in nanotechnology), IT companies or hospitals. Several graduates also continue their studies in master programmes. The Faculty of Physics and Engineering Physics offers several joint degree programmes in which the students spend one year in Vietnam and one year abroad. Most of these partners are in Taiwan, Korea, Japan, as well as, in Europe. The programme coordinators from the ETE programme add that their graduates predominately join the job market. The demand of jobs in electronics and telecommunications sector is very high, particularly in Ho Chi

Minh City, and therefore various companies compete for skilled workers. The stakeholders also confirm this situation.

In the discussion with the programme coordinators, the experts wonder, how the programme coordinators of one programme communicate among themselves and how they communicate with those of other programmes. The programme coordinators of the ETE programme mention, there are three programme coordinators involved in the bachelor's programme, each being responsible for one specialization (Electronics, Computer – Embedded Systems and Telecommunication – Networks). They meet regularly and further collect direct feedback from colleagues within their faculty. The programme coordinators note, their study programmes are very different, thus there is little interaction among the programme coordinators of different programmes. The programme coordinators of the bachelor's programme *Mathematics* add, they have four programme coordinators responsible for one specializations each (Mathematics, Mathematics and Computer Science, Mathematics Education and Quantitative Finance). They hold meetings of their scientific committee once or twice each semester. Within the departments, they foster direct communication among the different responsible people, who are available to discuss student feedback and suggestions to adapt modules and the study programme. Until 2021, the Faculty of Mathematics offered one single study programme; therefore, the coordination among lecturers was easily organized. Since 2021, two bachelor study programmes were added (Mathematics and Computer Science and Data Science), which caused significant and ongoing changes in the Faculty organization. The programme coordinator of the bachelor's programmes *Physics* confirm that this holds true for physics, as well.

The expert panel concludes that the objectives and learning outcomes of the degree programme are described briefly and concisely. They are transparently anchored and published on the programmes' web pages and are thus available to students, lecturers and interested third parties. In the opinion of the experts, the objectives and learning outcomes reflect the targeted academic qualification level, are feasible and equivalent to the relevant exemplary learning outcomes specified in the applicable SSC (academic classification). The intended competence profile further represents the level of qualification according to the European Qualifications Framework. The experts further remark, that the relevance of the objectives and learning outcomes are reviewed on a regular basis involving relevant stakeholders and considering the demand on the labour market and the society. They further state that the qualifications are clearly presented in the diploma and the diploma supplements.

Criterion 1.2 Name of the degree programme

Evidence:

- Self-assessment report
- HMCUS web page https://www.hcmus.edu.vn/
- Diploma, diploma supplements and transcript of records
- Discussions during the audit

Preliminary assessment and analysis of the peers:
The names of the three bachelor study programmes under review were chosen based on a list of programme titles issues by the Ministry of Education and Training. In the opinion of the VNUHCM-US, these are also reflecting the international current standards.

The expert panel agrees that with the names of all three bachelor's programmes reflect the intended aims and learning outcomes of the programme. The experts support that the programme names are well recognized in both English and Vietnamese and further reflect the main course language of each programme. The names of the programmes are, hence, adequate. Furthermore, they are used consistently in all relevant documents and all web pages.

Criterion 1.3 Curriculum

Evidence:

- Self-assessment report
- Module handbook of each programme
- Web page programme Mathematics https://math.hcmus.edu.vn/en/
- Web page programme Physics https://phys.hcmus.edu.vn/
- Web page programme Electronics & Telecommunications Engineering http://www.fetel.hcmus.edu.vn/en/electronics/
- Discussions during the audit

Preliminary assessment and analysis of the peers:
Structure of the programmes and updates of the curriculum

Each bachelor's programme under review has a standard duration of eight semesters (four academic years). The study programmes are constructed using modules, which consecutively communicate the programme learning outcomes to the students. Each programme includes compulsory and elective modules to allow the students to adapt the focus of their

studies to their interests. The curriculum is constructed systematically to allow the students to gain a deeper knowledge through parallel courses and prerequisite courses. The curricula considers global and regional trends in education and science. The curriculum including the module handbook and a suggested study plan is posted on the website of the university. The university uses a syllabus, which is standardized and contains basic information about the course, the instructor, course goals, content overview, evaluation criteria, learning material, and references for further reading.

The bachelor's programme *Mathematics* consists of a minimum amount of 131 credits, which is divided into three knowledge blocks: (1) general knowledge, (2) Professional education and (3) graduating works. The first block focuses on the basics in natural science and English as well as Natural Defence Education and physical education. The block of professional education is further divided into "foundation" and "specialization." While the foundation introduces the students into the field of general mathematics, the specialization allows the students to pursue their interest in one field of mathematics. The bachelor's programme *Mathematics* offers four specializations, namely, (1) Mathematics, (2) Mathematics and Computer Science, (3) Mathematics Education and (4) Quantitative Finance. The last knowledge block contains the final project or graduation thesis.

The curriculum of the bachelor's programme *Mathematics* is constantly evaluated and updated. While the lecturer can implement small changes during the semester, larger adaptions of the curriculum require the approval of the Scientific and Academic Faculty Council and consider the opinion of stakeholders. The last major adaption of the curriculum in *Mathematics* was the introduction of the specialization "Mathematics and Computer Science" in 2019.

Table 1.12. Mathematics programme structure

Knowledge modules	Number of credits					
	Required		Optional		Total	
	Credits	ECTS	Credits	ECTS	Credits	ECTS
] **I. General Education** (excluding National Defense Education, English, Basic Computer, Physical Education)	46	73.5	8	12.5	54	86
II. Professional Education						
II.1. Foundation in Concentrations	15-18	25-29.5	4	0-6.5	15-19	25-31.5
1. Mathematics Concentration	15	25	4	6.5	19	31.5
2. Computer Science Concentration	15	25	4	6.5	19	31.5
3. Mathematical Education Concentration	18	29.5	0	0	18	29.5
4. Quantitative Finance Concentration	15	25	0	0	15	25
II.2. Specialization	15-23	23.5-37.5	25-33	40-53	48-52	73.5-79.5
1. Mathematics Concentration						
- Mechanics	16	25	32	49	48	74
- Algebra	16	24	32	49	48	73
- Analysis	16	25	32	49	48	74
- Numerical Analysis	16	24	32	50	48	76
- Probability and Statistics	16	24.5	32	50	48	74.5
- Optimization	15	23.5	33	51	48	74.5
2. Computer Science Concentration						
- Data Science	23	37.5	25	40	48	77.5
- Mathematical Methods in Computer Science	16	26	32	51	48	77
- Applied Mathematical Computer Science	15	24.5	33	53	48	77.5
3. Mathematical Education Concentration						
- Didactics and Methodology of Mathematics Teaching	20	34.5	29	45	49	79.5
4. Quantitative Finance Concentration						
- Mathematical Finance	20	32.5	32	51.5	52	73.5
III. Graduating works	10	20	0	0	10	20
Total accumulated credits(ECTS) for graduation (I+II.1+II.2+III)					**131**	**204.5 -217**

The bachelor's programme *Physics* has established a curriculum based on the same concept offering three knowledge blocks: (1) general knowledge, (2) professional education and (3) graduating works. The first block focuses on the basics in natural science and English as well as Natural Defence Education and physical education. The block of professional education is further divided into "foundation" and "specialization." The bachelor's programme Physics offers seven specializations: (1) Physics and Electronic Engineering, (2) Solid State Physics, (3) Nuclear Physics, (4) Geophysics, (5) Theoretical Physics, (6) Physics and Computer Science, and (7) Applied Physics. The last knowledge block contains the final project or the graduation thesis. Depending on the specialization, the total amount of credits for the study programme varies between 126 and 132 Vietnamese credit points.

Table 1.13. Physics programme structure

Knowledge modules	Number of credits					
	Required		Optional		Total	
	Credits	ECTS	Credits	ECTS	Credits	ECTS
I. General Education (excluding National Defense Education, English, Basic Computer, Physical Education)	47	73.5	4	6	51	79.5
II. Professional Education						
II.1. Fundamentals of Physics	33	52	0	0	33	52
II.2. Specialization	26-32		6-7		32-38	
1. Physics and Electronic Engineering	30	48.5	7	11	37	59.5
2. Solid State Physics	27	44.5	6	9.5	33	54
3. Nuclear Physics	30	49	6	10	36	59
4. Geophysics	30	46.5	7	11.5	37	58
5. Theoretical Physics	26	39.5	6	9	32	48.5
6. Physics and Computer Science	31	52.5	6	10	37	62.5
7. Applied Physics	32	55.5	6	9.5	38	65
III. Graduating works	10	20	0	0	10	20
Total accumulated credits(ECTS) for graduation (I+II.1+II.2+III)					**126 -132**	**200-216.5**

The curriculum of the bachelor *Physics* is designed to teach the students the established learning outcomes in eight semesters or four academic years. The content of each module contributes to the research-oriented and multi-disciplinary goals the Faculty of Physics and Engineering Physics. Adjustments made after consulting partners and stakeholders ensure that the bachelor's programme Physics has a modern, practically oriented, and up-to-date curriculum. Therefore, almost half of the modules combine knowledge with practical application and attitude. The curriculum contains compulsory modules, as well as, elective modules to allow the students to deepen their knowledge in fields of their interest. Each module formulates a clear goal, requirements, and in its contribution to the learning outcomes of the programme in detail. The curriculum has a well-established structure to ensure that the students fulfil all requirements of the modules and the workload is well-balanced between theoretical and practical modules. In the past year, the programme was adjusted to reduce the load of theoretical courses in order to accommodate practical hours (exercises), practical assignments and self-study (projects). This measure was taken to deepen the personal skills and responsibility of each student in order to better prepare them for the job market. Each module is constantly surveyed, and stakeholders and partners are involved in a regular review of the curriculum.

The structure of the curriculum of the bachelor's programme *Electronics and Telecommunications Engineering* is comparable to the programmes *Mathematics* and *Physics*; it is divided into three knowledge blocks: (1) general knowledge, (2) professional education and (3) graduating works. The first block focuses on the basics in natural science and English as well as Natural Defence Education and physical education. The block of professional education is further divided into "foundation" and "specialization." The bachelor's programme ETE offers three specializations: (1) Electronics, (2) Computer-Embedded systems, and (3) Telecommunication-Network. The last knowledge block contains the final project or graduation thesis. Depending on the specialization, the total amount of credits for the study programme varies between 131 and 132 Vietnamese credit points.

The total duration of the study programme is eight semesters or four academic years. The curriculum contains compulsory and elective modules. The number of electives modules accounts for more than 50% of the entire curriculum of the study programme allowing the students to choose their field of interest. The curriculum can be accessed from the university and the faculty web page. Major reviews of the curriculum are conducted every two years considering the trends in science and technology, as well as, social needs. Moreover, the programme also collects feedback from stakeholders including enterprises, alumni, lecturers and students.

Table 1.14. ETE programme structure

Knowledge modules	Number of credits					
	Required		Optional		Total	
	Credits	ECTS	Credits	ECTS	Credits	ECTS
I. General Education (excluding National Defense Education, English, Basic Computer, Physical Education)	42	58.5	10-11	16-17.5	52-53	74.5-76
II. Professional Education						
II.1. Foundation	35	56.5	0	0	35	56.5
II.2. Specialization	22-26		8-9		31-34	
1. Electronics	26	41.5	8	13	34	54.5
2. Computer-Embedded systems	26	42.5	8	13	34	55.5
3. Telecommunications-Network	22	35.5	9	14-15	31	49.5-50.5
III. Graduating works	10-13	18-25	0	0	10-13	18-25
Total accumulated credits (ECTS) for graduation (I+II.1+II.2+III)					**131-132**	**202-208**

Based on the learning outcomes, the sequence and content of each modules are designed. Due to the practical orientation of the bachelor's programme ETE, many modules address practical aspects, which allows the students to learn the practical skills desired on the job market.

In the discussion, the representatives from the rector's office explain to the experts, that the curriculum of each study programme is under a detailed review every other years. In this process, the evaluation results of students, lecturers, and stakeholders are considered. The last major revision of the bachelor's programme *Mathematics* was conducted in 2019 when further specialisations called "concentrations" were added to the programme, leading to the following four currently possible specializations "Mathematics concentration", "Computer Science Concentration", "Mathematical Edu-cation Concentration", and "Quantitative Finance Concentration."

The bachelor's programme ETE also conducts a detailed revision of the curriculum every two years. They hold separate meetings with representatives from industry to collect their feedback. In their last meeting in August 2022, they generally praised the curriculum, but suggested to add modules on artificial intelligence and IoT (Internet of Things). As a consequence, the programme coordinators included five elective modules to their curriculum. All stakeholders confirm the experts that they are regularly asked by the programme coordinators for their feedback on the curriculum. They also organized a follow-up workshop in order to develop strategies on how to facilitate their demands in the curriculum. Some stakeholder mention that their recommendations had been implemented in the curriculum review in the following year. The stakeholders stress their general satisfaction with the curricula of the three bachelor's programmes under review.

The expert panel is interested in the maximum number of students admissible for a single module and how each faculty manages the case that the number of registered students exceeds this limit. The programme coordinators state that the current number of students per module is 120, which is discussed and adapted annually. Such high numbers can occur only in the foundational courses of each bachelor programme before the students select their specialization courses. The faculty approves larger classes as long as the classrooms are sufficiently large to accommodate the students. Currently, several classes have up to 180 registered students. The programme coordinators remark that fewer students are actually present in the lectures since attendance is not mandatory. The programme coordinators mention, if the total number of registrations in one course is reached, the students can always contact them personally to make an exception. This is common practice at VNUHCM-US and until now a satisfactory solution to enable interested students to join the lectures they were interested in were always found. The programme coordinators of the programme *Mathematics* add that they normally do not have limits to their introductory modules. If the number of registered students exceeds 200, the lecturer asks the faculty board to divide the group in two to accommodate the students. In contrast, specialization

classes can have less than 10 registered students (e.g. in pure mathematics)[5]. The expert panel asks the students, if they ever had problems sign up for one module due to high registration numbers. The students answer that fully booked courses occur, after applying to the responsible lecturer, however, they could always participate in the module. In addition, students also report, that the university also made exception for course with registrations numbers below the minimum (e.g. algebra or calculus in *Mathematics*). Students of the bachelor's programme *Mathematics* add, the department has enough lecturers, therefore opening a second course at the foundational level, if necessary, and this is common practice, indeed.

Moreover, the experts request information for when the university publishes the schedule of the courses of the next semester. The programme coordinators explain that the schedule is published before the beginning of the (lecture period of the) semester. Generally, the lecturer chooses the time of their lectures, but students may ask to change this in case they have a conflict in their schedule. Once the lecturer receives such a request, they ask the students to make a survey among all registered students of this module. The programme coordinators specify, the main lectures are well-arranged considering the compulsory modules and point out that each lecturer only has to teach at one campus on a single day. The students confirm, the organization of the programme allows them to accommodate their study plan in accordance to the schedule.

Furthermore, the expert panel was curious on how the students select their elective modules. The programme coordinators describe the procedure: The faculty outlines a study plan to the students and offers consultation on the elective modules on an individual basis and with a corresponding academic advisor of the students of each year. In the third semester, the students need to select their specialization. This part of their studies still contains mandatory courses in combination with elective modules. The programme coordinators state, that the offered elective modules are strongly determined by the demands on the job market and new trends in the field of science and technology. In addition, the dean of each faculty organizes an event to communicate directly with the students. In this event, the dean introduces changes in the programmes and gives advice to the study paths the students can take. The students add to this description that they have to select their specialization in the fourth semester. They further add that their decision, which modules to select is based on the content description in the module handbook, which contains sufficient information in their opinion. They confirm that the lecturers and their academic advisors are available to give them individual advice on selecting the most suitable modules for their career ambitions. The students report to the experts that they are satisfied with

[5] „a good, abstract mathematics lecture does not need any audience!"

the variety of available courses and elective modules. In their opinion, the courses are well-distributed across all semesters. They additionally mention that only a few courses that require a previously completed module.

The discussion focused further on the topic of teaching soft skills. The programme coordinators mention, they offer one module on soft skills and teamwork to freshmen students in the first semester. In the following semesters, training on these skills is integrated into the modules deepen their practical use. Classroom activities often integrate exercises and assignments to enhance problem-solving and critical-thinking skills. The stakeholders remark, that they generally consider the soft skills of the students to be good. In their opinion, the students are above average in problem-solving of specific assignment; they still have, however, difficulties to understand the larger picture. In general, their team working skills are good. One stakeholder summarises that he would give the students ten points in technical skills and seven in soft skills, the latter lower score because of incompetent presentation and communication skills.

The experts identify insufficient proficiency in English as one common problem among students. The programme coordinators point out that the curriculum of each study programme under review contains courses in English. In addition, the teaching staff mentions to the experts that they include English in their slides and give references for further reading in English. The university has recently started to offer webinars in English to which they often invite international speakers. Assignments in various lectures might also include writing a report after reading a book chapter in English or giving a presentation in English. The programme coordinators of the programme *Physics* mention that they also organize an "English club" for students at the specialization level (fifth semester and higher). The students add that they often search for information in English to compare to the contents of their lectures. Others mention that the lecturers often introduce their newest publications in class and distribute these to everyone who is interested. Nevertheless, the students inform the experts that they wish to improve their English skills, particularly in their field of expertise (technical English). The stakeholders support the students' desire to improve their English proficiency. They tell the experts that many companies require good English skills from their new employees including communication and presentation skills. In their opinion, some students are not confident in English, which forces the companies to additionally train them before they start working in international projects.

The experts further show interest on how the scientific research was integrated into the modules and if students have access to participate in scientific activities. The programme coordinators of the programme *Physics* state that they have several scientific projects for young researchers, but they commonly focus on the master level or higher. The teaching staff of the programme adds that they invite talented students to join a seminar which

follows the scientific progress at the university. Additionally, scientific ideas and results are integrated into the lectures. The programme coordinators of the programme *Mathematics* add that they have seminar groups for third and fourth year students. Students are welcome to join the seminar and can also request a topic to work on. The seminar members then guide the students on conducting scientific research and on reading and writing scientific publication. Since many students are very active in this seminar, it does happen that students publish their first scientific article in the fourth year of their studies. The teaching staff of the programme *Mathematics* adds that applied mathematics, their research is integrated into the lectures. In addition, free webinars are often offered to introduce the students to new topics.

Internship

An internship (four Vietnamese credits) is possible as an elective module in the bachelor's programme *Mathematics* with the exception of the specialization "Mathematics Education Concentration." Students, who choose this specialization, are required to participate in a Mathematical Pedagogy Internship, which is carried out at a high school or education centre. An internship is integrated into the curriculum of *Physics* as a compulsory module in the seventh semester, awarding two credit points to the participants. The students of the bachelor's programme ETE need to complete an internship (worth three credit points) with a commercial enterprise.

In the discussion with the programme coordinators, the experts ask them to explain the regulation of an internship and the research project. The answer differs in each bachelor's programme. In the programme ETE, the internship is compulsory and awarded with three credit points. Additionally, the graduation thesis is also mandatory. In the programme *Mathematics*, the internship is an elective module, which some students take in the seventh or eighth semester. The lecturers generally advise the students to consider an internship in order to collect working experience before entering the job market after graduation.

The experts also ask the stakeholders whether they regularly receive interns from VNUHCM-US. The stakeholders confirm to receive applications for internships on a regular basis and are satisfied with the qualifications and skills of the students. After a successful internship, it frequently occurs that the stakeholder offers a job after graduations to the students. The stakeholder generally welcome the implementation of an internship in the curriculum, although they suggest to extent the internship to more than three month. One representative if a company explains that the company does not offer internships, but students can join their company as "job shadows" to be able to observe the daily business and practice. The students explain to the experts, one source of information for internships in

all study programmes, next to the university web page, is a job fair, where companies are invited to the campus to introduce themselves. The lecturers advise their students to prepare their CV in advance because many companies at this event directly accept applications for internships. Other students describe, that they fund their internship based on contacts from the student support centre. Students summarize, they mainly spend between three and six months on one internship. The students add that next to the internships, the university also conducts excursions to companies in the programme ETE.

Student Mobility

The bachelor's programme *Mathematics* offers exchange programmes to their students to go abroad. One specific exchange programme with the University of Paris-Nord (XIII) allows students to spend one semester in France and students from France to visit the VNUHCM-US. The university states, they are planning to enhance this programme by planning to offer more courses in English. However, the HEI explains, most students go abroad to study for their master or PhD degrees. The university is cooperating with universities in Europe (France, Italy, Belgium), the US and Asia (Singapore, South Korea and Taiwan). The bachelor's programme *Physics* offers several exchange programmes with universities in Taiwan, Japan, South Korea, Australia and Poland. The HEI further offers several double degree master programmes for students who decide to pursue a higher degree. Countries with partner universities include France, Italy, Japan, Taiwan, South Korea, Japan, and the USA. The Faculty of Electronics and Telecommunications has a strong cooperation with the University of Electro-Communications in Japan, offering student exchange programmes. From 2017–2019, three students each spend two semesters at the partner university in Japan. In the programme, it is optional to write the bachelor thesis in Japan, which requires a second defence of the thesis in Vietnam. Students from Japan usually spend less time at VNUHCM-US. They continue their studies for two months in Vietnam. Additional exchange can be organised through the International Affairs Office. The standard procedure consists of an application and an interview to prove their English proficiency. If successful, the students are granted airfare, tuition and living expenses.

The experts asks for more details on the student mobility. The programme coordinators of *Mathematics* and *Physics* mention, the university has numerous Memorandums of Understanding with universities in other countries. Most of these, however, focus on the master programmes. Especially the programme representatives of the Faculty of Physics and Engineering Physics state that part of their master programme are five double-degree options, which are very popular among students. In contrast, the student mobility in the bachelor's programmes is still low. Several students in the undergraduate programmes take part in

internships abroad, which last between three and six months. All programme coordinators mention, they encourage their students to spend time abroad, applying either for a student exchange programme or for internship in a foreign company. The students tell the expert panel, that they know about the cooperations between VNUHCM-US and international universities for the master programme. The teaching staff informs them about these programmes plus additional information is posted online and on a board on campus. The teaching staff further inform the experts that the academic advisors actively discuss with students in the third semester the options for going abroad. To participate in an international exchange programme, the students first need to complete their English courses to prove their English proficiency. Therefore, the advisors guide the students to complete all essential modules to facilitate a term abroad.

In conclusion, the experts have a positive opinion of the curriculum of all three study programmes under review. They are convinced that the curriculum of each programme enables the students to achieve the intended learning outcomes. The learning outcomes are defined for each module, which, in total, enable the achievement of the overarching programme objectives. The expert panel considers each module defined by the university is a well-matched unit of teaching and learning, transferring knowledge, skills and competencies to the students. In the opinion of the experts, the order of the modules ensures that the learning outcomes can be achieved and that the programme can be completed within the standard period of study. With the various specialization options in each programme as well as the number of elective modules, the programmes are constructed to allow for individual focal points and courses of study. Furthermore, the experts confirm that the curriculum is periodically reviewed, involving also stakeholders with regard to the implementation of the programme objectives. Curricular changes are well-documented. The experts also note, that the university promotes international student mobility in an appropriate framework for study exchange programmes and internships abroad. The study programmes offer internships, which are well-integrated into the curriculum and well-received by students and stakeholders. The experts are satisfied with the organization (e.g., job fairs), as well as, the coordination with the participating companies and the supervision of the students during the internship.

The experts, however, see room for improvements considering the soft skills of the students. Especially the English proficiency is an important issue in their opinion. They suggest the university to include strategies to foster the English skills of the students in their lectures. This might include new courses on simplified technical English or a stronger implementation of English communication and presentation in other lectures or seminars. Furthermore, the experts suggest taking measures to improve the overall presentation skills

of the students. They suggest including a module of a student seminar, which primary focuses on presentation techniques, rather than scientific contents. Overall, the experts identified different standards in both lectures and exams. They suggest VNUHCM-US to review their modules and exams and unify their standards.

Criterion 1.4 Admission requirements

Evidence:

- Self-assessment report
- Translation of the admission regulation of VNUHCM-US
- HMCUS web page https://www.hcmus.edu.vn/
- Web page programme Mathematics https://math.hcmus.edu.vn/en/
- Web page programme Physics https://phys.hcmus.edu.vn/
- Web page programme Electronics & Telecommunications Engineering http://www.fetel.hcmus.edu.vn/en/electronics/
- Discussion during the audit

Preliminary assessment and analysis of the peers:

The admission at VNUHCM-US is regulated to control the number of enrolled students. According to the SAR, a review of the admission criteria is conducted every year, to combine the university's global admission criteria with the specific criteria of each department. The university posts this information on their web page and further distributes the information in mass media, social media, flyers, and shares information material of the admission-counselling day.

There are six enrolment methods at the VNUHCM-US, which can be divided into regulations for gifted students, regulations for international students and national students who participate in the national high school graduation examinations and the competency assessment examination organized by the VNUHCM. Gifted and international students often receive priority or direct admission, while in general students have to register for the admission. Applicants either submit their high school documents or register in advance for the competency assessment examination organized by VNUHCM. The applicants can name three study programmes of interest and usually apply online. The admission council evaluates all applications and selects the most suitable students based on a quota of each enrolment group.

The experts are curious to know which factors impact a successful admission at VNUHCM-US. The representatives of the rector's office explain that until 2015 the admission at the university was based on national examination. This examination was afterwards replaced by a test organized by the Vietnamese National Universities in Ho Chi Minh City. From this group, approximately 40% of students receive their admission. The same number of students (~40%) receive their admission based on the results of their high school exams. The remaining 20% is a mixture of excellent students and international students.

The expert panel thinks that the admission requirements and procedures are binding and transparent. The admission regulations are regularly evaluated with respect to ensuring sufficient (subject-related) prior knowledge of the students.

Criterion 1.5 Workload and Credits

Evidence:

- Self-assessment report
- Module handbook of all study programmes
- Curriculum of all study programmes
- Credit transfer regulations between the Vietnamese Qualification Framework and the European Credit Transfer and Accumulation System
- Discussion during the audit

Preliminary assessment and analysis of the peers:
VNUHCM-US calculates the workload following the Vietnamese Qualifications Framework awarding credit point. A transfer system is developed using the ECTS user's guide and presented to the expert panel prior to the on-site visit.

The Vietnamese Qualification Framework implements the following principles:

(1) One study period is equal to 50 minutes of direct classroom instruction.
(2) Each credit is equal to 15 theory periods; 30 or 45 periods for practice, experiment, or discussion; 15 or 30 exercise periods; 30 periods for essays, big assignments or projects, and graduation theses.
(3) To acquire a credit of theoretical, practical, or experimental modules, students must spend at least 30 self-study hours.

Based on the different consideration of self-study time and contact hours, the HEI developed the following conversion:

- 1 theoretical credit = 15 periods x 50 minutes + 30 self-study hours = 42.5 hours, equivalent to 42.5/27.5 = 1.5 ECTS.
- 1 practical credit (experiment/discussion/internship/project/dissertation/thesis) = 30 periods x 50 minutes + 30 self-study hours = 55 hours, equivalent to 55/ 27.5 = 2 ECTS.

The workload of the students each semester depends on the courses they choose. On average, the students take courses with a workload ranging between 14 and 25 Vietnamese credit points each semester. The intended module distribution for each semester is presented on the web page and in introductory events to first year students. An individual study plan can be developed with advice and support from lecturers, academic advisors, the Office of Academic Affairs or consulting channels from the faculty forum or alumni. The workload of each module is clearly presented in the module handbook and in the syllabus. According to the monitoring and evaluations of the study programmes, the workload is realistic.

All bachelor's programmes under review have an intended study duration of eight semesters or four academic years. The bachelor's programme *Mathematics* requires a minimum of 131 credits to complete the studies, whereas the bachelor's programme *ETE* requires a minimum if 130. The minimum total amount of credit points in the bachelor's programme *Physics* depends on the specializations and ranges between 126 and 132 credit points.

The presented module handbooks state the total workload of contract including contact hours and self-study hours. The module handbook of the programme *Physics* shows the amount of Vietnamese credit points and ECTS credit points in parallel, while all other module handbooks only list the Vietnamese credit points.

Upon request of the expert panel, the representatives of the rector's office give them a short overview of the academic year at VNUHCM-US. Generally, the year is divided into two semesters. The first semester lasts from September to January (15 weeks) whereas the second semester starts in mid-February and ends in June. In each semester, mid-term exams are held in the 9^{th} or 10^{th} week of the semesters, followed by a week of exams at the end of each semester.

The students explain to the experts, that they regard the workload to be appropriate. At the beginning of each course, the lecturer explains the workload of this module and how many hours they have to be in class and how many they are expected to study at home. Thus, they consider the workload stated in the module handbook to be accurate.

The experts summarize, that VNUHCM-US has implemented a credit point system, which considers contact hours and self-study time. Credits are awarded for every module based

on the respective workload. The workload distribution is equal among the semesters and verified to be realistic. This lets the experts conclude, that the workload is regularly monitored and that students are involved in this process. The calculations from Vietnamese credits to ECTS points is well explained and integrated into the curricular overview presented in the SAR. However, the experts further would consider it necessary to also show the ECTS credit point conversion in the transcript of records (criterion 4.2) and all module handbooks (criterion 4.1)

Criterion 1.6 Didactic and Teaching Methodology

Evidence:

- Self-assessment report
- Module handbooks of each study programme
- Discussions during the audit

Preliminary assessment and analysis of the peers:
The HEI states, that the faculty staff is both professional and experienced, and thus applies a variety of teaching methods appropriately chosen to the characteristics of each module. The applied teaching method is part of the syllabus, which the students receive at the beginning of each semester and are included in all submitted module handbooks. During the first years of the study programmes, the students in each module may exceed 100, whereas during specialization classes, the size of the modules typically ranges between 10 and 30 students.

The majority of the modules include teaching methods such as lectures and reading assignments. Lecturers implement active teaching and learning methods such as group discussion, teamwork, problem-based learning, case studies and project-based learning to provide a platform for the students to learn and practice their skills. In seminars or workshops, the students are guided to improve their critical thinking and teamwork skills by learning how to identify a problem and find a solution. In the bachelor's programmes *Physics* and ETE, the students are required to take part in several courses focusing on laboratory work. In these courses, the learning methods differ with the purpose to develop practical skills together with scientific research in order to collect, analyse and synthesize data. Moreover, additional scientific thinking is trained in various extracurricular activities including clubs and contests on the campus.

The teaching staff confirms this diversity of teaching methods to the experts. They further report to integrate research and project-based learning into their lectures. They also give

assignments to the students to foster their independent learning, which often conclude with a final presentations.

The experts therefore consider that the teaching methods and didactic means used to promote achieving the learning outcomes are adequate and support student-cantered learning and teaching. The degree programme contains an adequate balance of contact hours and self-study time. The teachers aim to introduce students to independent scientific work. In the opinion of the experts, the teaching methods are regularly reviewed and updated with respect to the utilized learning and teaching methods.

Final assessment of the peers after the comment of the Higher Education Institution regarding criterion 1:

As VNUHCM-US describes in their statement, they indent to expand the amount of English in their courses and consider establishing new modules to foster the soft skills of the students. Since this process is still ongoing recommendations of criterion 1 are still supported by the expert panel.

2. Exams: System, Concept and Organization

Criterion 2 Exams: System, concept and organization

Evidence:

- Self-assessment report
- Module handbooks of each study programme
- Exams presented during the audit
- Examination regulations
- Discussion during the audit

Preliminary assessment and analysis of the peers:

At the VNUHCM-US, the semesters has two examination periods. The schedule of the examination periods is announced at the beginning of each academic year

The examinations of each module are developed between the lecturers and the Science and Academic Committee of each study programme. This ensures that the exams contribute to the programme learning outcomes of each programme. Each problem of an exam is

therefore representing a course objective or learning outcome. If two courses of the same module are organized, examinations are schedules at the same time and with the same contents to ensure fairness.

The information on the applied assessment method of each course is communicated with the students in the syllabus, as well as, the module handbooks. They clearly state the assessment methods and show the different criteria, which are considered in the final grade of the module. According to the regulations at the HEI, the lecturers can apply several assessment methods in one exam to deploy the most suitable methods for each problem. The form of assessment depends on the content of each module. Most modules at early semesters use written examinations to evaluate the students' knowledge and skills. For small classes (most classes in the specialization stage), individual assignments, group assignments or group work are often part of the grading policy of the modules. Several modules have a special assignment form, such as the course Seminar on Specialization (discussions, essays, presentation, etc.) or project-based internships (assessment sheets and comments from the internship-receiving enterprises). For practical modules, the students are required to participate in practical exercises, which contribute to of the final grade.

The grading point systems generally apply a 10-point scale, whereas the 4-point scale and the letter scale are only used for reference purpose. Students need to achieve at least 5.0 out of 10 to pass a module. Cumulative grades are integrating multiple assessment methods. The individual weight of the percentages of the final exam varies between modules. The applied grading system is clearly stated in the syllabus, the web page and the module handbooks and is additionally communicated to the students at the beginning of each module.

Table 2.1. VNUHCM-US Grading System

10-point scale	4-point scale	Grade	Classification	Study result
9.0 to 10	4.0	A+	Exellent	Pass
8.0 - below 9.0	3.5	A	Very good	Pass
7.0 - below 8.0	3.0	B+	Good	Pass
6.0 - below 7.0	2.5	B	Fairly good	Pass
5.0 - below 6.0	2.0	C	Average	Pass
4.0 - below 5.0	1.5	D+	Weak	Fail
3.0 - below 4.0	1.0	D	Poor	Fail
Less than 3.0	0.0	F	Poor	Fail

Table 2.2. Weighting distribution of different assessment components

Type of modules	Performance assessment	Weighting percentage
Theoretical modules	Ongoing assessment	20% - 30%
	Mid-term test	20% - 30%
	Final exam	50% - 60%
Project modules	Supervisor assessment	50%
(mini project, internship report)	Final assessment	50%

The examination regulations include regulations on exam postponement to handle unforeseen circumstances (such as sickness, accidents, etc.), which prevent the students from taking the exam. Students can also retake the exam to improve their grade. Furthermore, regulations are in place to appeal about the grading if the students consider this necessary.

The expert panel inquires on the seemingly exclusive choice of written examination as a form of exam in all three bachelor's programmes under review. The programme coordinators from the programme *Mathematics* admit that generally exams are conducted in a written form. Oral exams become more common in the specialization of the studies, when the number of students per classroom significantly decreases. Similarly, some modules in higher semesters also implement presentation as an assessment criterion. Nevertheless, the final examinations at the end of the semester tends to be in writing. The other programme coordinators confirm a comparable organization of the exams in their programme

whereas the programme coordinators of the programme ETE specify that in their programme, additional practical examinations are integrated into modules with a large practical component. They further add that the exams are based on the learning outcomes. The assessment methods applied in each module and their contribution to the final grade are presented to the students on the first day in class next to the information available on their web page.

The students state that they are satisfied with the examinations of their study programmes. They continue that the content of the exams was always part of the lecture and that the number of exams and assignments is manageable. The students confirm that before exams, they have one week to prepare for their examinations. They add, several courses might only last for ten weeks instead of 15, yet the examinations are all in one week. One week to prepare for their exams is also the time period available before their mid-term exams according to the students.

Graduation thesis

Although three bachelor's programmes under review present a graduation thesis in their study plan, this module is not mandatory. The credit point systems awards ten points for the graduation thesis, however, this module is not compulsory. If the students take other courses to complete their minimum of 131 credits, the graduation thesis can be-bypassed. The programme coordinators of *Mathematics* specify that in their programme the graduation project is only mandatory in the honour programme (which is not under review). Several students in the programme *Physics* also mention they would combine their internship with the graduation thesis, which has a workload of ten credit points.

The expert panel also discusses the topic of the graduation thesis with the students. The students confirm that in the programmes *Mathematics* and *Physics*, there are alternatives to writing a graduation thesis. Based on their information, writing a graduation thesis takes one semester to perform the practical work and one semester to write the actual thesis. The expert panel also discusses the graduation thesis with the teaching staff. The lecturers of the programme *Physics* explain, they normally divide the students of the fourth year in two groups; the students with generally low grades (average below 5.5) are advised to complete their studies by taking additional courses while the students with good grades are encouraged to write a graduation thesis. The fraction of students who write a thesis depends on the specialization of the programme. For example, in Applied Physics, around 90% write a graduation thesis. The teaching staff of the Faculty Mathematics describe a similar situation, however, only around 10 to 15% write a graduation thesis. In the programme ETE, the students have the options to select between a seminar and a graduation thesis. The division among their students is 50%. If students decide to write a thesis, the

teaching staff describes that they mainly propose a topic to the students. Only in few cases, the students propose their own topic. While in the programme ETE, a collaboration with a company on a bachelor thesis is rare, a cooperation is the rule in the programme *Physics*. Answering a corresponding question of the experts, the programme coordinators reply that it is possible to write a graduation thesis in English provided the level of English proficiency of the student in question is sufficiently high.

In conclusion, the experts formulate the opinion, that the exams presented do assess the objectives from each module. They confirm that the exams relate to specific modules and provide students with feedback on the competencies that they have acquired. Types of exams are specified for each module. Students are informed about the conditions for completing the module (coursework, exams etc.) at the beginning of the module and within the syllabus. These rules and regulations are transparent and offer possibilities for make-up exams, non-attendance, cases of illness, as well as, compensation of disadvantages. The experts have no concern about the number and distribution of exams, which are well-integrated within an adequate workload as well as sufficient time for preparation. The experts confirm that the students have the opportunity to consult their lecturers about the results of their exams. Furthermore, it is regularly reviewed whether the exams can adequately determine the achievement of the learning objectives, whether the requirements are appropriate to the level of the degree programme, and whether students have sufficient time for preparing and conducting the exams.

The experts raise, however, criticism to the organization of the graduation thesis or final project. In their opinion, the students should be involved in a final thesis or project in order to demonstrate that the students are able to work independently on a task at the intended level of the degree programme.

Final assessment of the peers after the comment of the Higher Education Institution regarding criterion 2:

As stated by VNUHCM-US in chapter E, they intend to a mandatory final project or graduation thesis in order for all students to demonstrate their skills to complete an independent in a certain amount of time. To avoid any confusion between the terms graduation thesis, final project and final seminar, the expert panel suggests the use of only one term applied for all students. Since these changes are not yet implemented, the experts continue to issue the requirement A1.

3. Resources

Criterion 3.1 Staff and Development

Evidence:

- Self-assessment report
- Staff handbooks of each study programme
- Discussion during the audit

Preliminary assessment and analysis of the peers:

The teaching staff of the VNUHCM-US is divided into lecturers, senior lecturers, and advanced lecturers. The nomination to associate professor and professor is a separate process on a national level in Vietnam, which neither affects their position as a lecturer in the teaching staff nor their individual teaching load. In the recent years, the VNUHCM-US has maintained a stable number of teaching staff.

Table 3.1a. List of Professors, Assoc. Professor, Doctor (PhD), Master and Bachelor

The academic staff	The Faculty of Mathematics and Computer Science	The Faculty of Physics and Engineering Physics	The Faculty of Electronics and Telecommunications Engineering
Professor	2	2	1
Assoc. Professor	5	10	0
Doctor	30	30	7
Master	19	24	34
Bachelor	0	6	0
Total	**56**	**72**	**35**

All staff members are required to perform three tasks of teaching, research, and participation in regular missions of the faculty. The ratio of lecturers to students at the bachelor's programme Mathematics is currently 1:13, in the bachelor's programme Physics it is 1:8.3 and in the programme ETE 1:14.6.

Criteria for newly hired staff includes their scientific research expertise and their pedagogical skills. To ensure adequate teaching of each module, the skills of the lecturers are assessed by annual evaluations as part of the module evaluation. If issues arise with the teaching methods and/or attitude, the faculty and the managing department initiates a meeting with the lecturer to discuss the problem and to find an adequate solution.

Each lecturer has to participate in scientific activities. Additional funding is raised applying for research grants. A summary of the scientific projects is shown in the table below:

Table 3.2. Scientific research projects of lecturers in the period 2017-2021

Projects	2017	2018	2019	2020	2021
The Faculty of Mathematics and Computer Science					
VNUHCM-US Projects	4	2	1	1	1
VNUHCM Projects	6	2	3	5	4
OTHERS Projects (Provincial/ HCM City/ Ministry/ National)	2	1	2	2	1
The Faculty of Physics and Engineering Physics					
VNUHCM-US Projects	6	5	9	7	12
VNUHCM Projects	7	6	12	7	6
OTHERS Projects (Provincial/ HCM City/ Ministry/ National)	3	4	3	1	1
The Faculty of Electronics and Telecommunications					
VNUHCM-US Projects	0	1	0	1	2
VNUHCM Projects	2	3	4	3	3
OTHERS Projects (Provincial/ HCM City/ Ministry/ National)	2	4	5	4	2

The research activity also results in publications at conferences and in journals. The number of publication is highest in the Faculty of Mathematics (40 to 60 research articles per year). In the Faculty of Physics and Physical Engineering, the research output for is calculated to 0.9 publications per person per year. The faculty of Electronics and Telecommunications publishes an average of 44 research publications in one year.

The research output of each department is shown below.

Table 3.3. Scientific publications in the period 2017-2021

Types of Publications	2017	2018	2019	2020	2021
The Faculty of Mathematics and Computer Science					
1. International papers	24	37	42	50	60
2. National papers	5	3	2	2	2
3. International conference	5	4	5	11	8
4. National conference	5	6	6	4	5
The Faculty of Physics and Engineering Physics					
1. International papers	40	50	37	51	47
2. National papers	12	15	13	19	15
3. International conference	5	9	3	3	5
4. National conference	8	8	4	1	4
The Faculty of Electronics and Telecommunications					
1. International papers	3	4	4	1	3
2. National papers	6	0	0	3	0
3. International conference	3	5	11	5	8
4. National conference	1	2	0	7	7

The university offers student academic advising to support them in their entire learning process. Student support staff is available at university level and faculty level, such as the Student Affairs Office, the Academic Affairs Office, or the Student Assistance Center. Teaching assistants are available during lectures to be able to support the students by answering their questions. New students at VNUHCM-US are invited to a student orientation week, which takes place in the first week of the new semester. Each faculty organizes a reception to introduce the basics to the new students and answer all their questions. The university organizes events to explain how to use the library as well as the regulations of the students' medical insurance and the dormitories. In addition, the faculty of VNUHCM-US regularly organizes a career orientation event to support interested students who yet have to find their major.

The teaching staff at VNUHCM-US is also motivated to develop their scientific research, as well as, their pedagogical skills. The faculty offers several ways to support their lecturers to

obtain a PhD. This includes, pursuing a higher degree at other national and international universities without losing their employment status at the HEI. It further includes financial support and an exemption for tuition fees at their university and coverage of tuition fees at other universities. Similarly, short-term scientific visits abroad are facilitated. The faculty financially supports attendance at scientific conferences.

In the discussion with the programme coordinators, the expert panel asks a question on the development of the staff numbers. The programme coordinators state that the number of PhDs, professors, and associated professors is rather stable. After graduation, many lecturers spend a period abroad to work on postdoctoral research project whereas others leave the university to start a job in a commercial company. In contrast, new lecturer often join after finishing their master's degree. The university is currently discussing new procedures to attract a higher number of qualified personal at the university. According to the programme coordinators, the salary at the university is low in comparison to salaries paid by commercial employers, which makes it often difficult to keep skilled lecturers. The programme coordinators of all programmes explain further, that it is difficult to advance to associate professor or professor in Vietnam, therefore the number of professors was decreasing in recent years.

According to the programme coordinators, VNUHCM-US is actively encouraging their employees to continue their higher education to receive a PhD degree. The teaching staff confirms this and adds that the university covers the admission and tuition fees for everyone who continues their higher education. The teaching staff confirms that the university also supports their teaching assistants to earn a master's degree and allows them short-term visits abroad for research. The experts further inquire which regulations are in place to involve teaching assistants, e.g., to help with the grading. The teaching staff states, currently teaching assistants are included for lectures with 100 or more students, however, from the next year on the limit is going to be lowered to 50 or more students.

The student tell the experts that they are very satisfied with the support they receive from the university and the teaching staff. They mention, the lecturers quickly reply to their emails and that the teaching assistants are easy to approach after and outside the classes. The teaching staff of the programme ETE explains to the experts, that the regulations state they should teach 810 40-min teaching hours per year (equivalent to 270 standard hours) and spend 590 hours on research and 360 hours on administration (total of 1760 hours in 44 weeks of one year). They admit to the experts that in some cases, the amount of teaching in one semester can reach up to peaks of 30 hours per week. The programme ETE has many students and therefore some lecturers have to teach additional courses. In contrast, the teaching staff in the programme *Physics* teaches up to three classes per week, which commonly range around nine hours of teaching in the classroom. The teaching staff of the

programme *Mathematics* confirm, their teaching load can also be high but does not reach the level of the ETE programme. Classroom hours can reach ten to twelve hours per week.

The discussion continues on the subject of incentives and other support of the university. The teaching staff describes to the experts that their salary is one part of their income, whereas they additionally receive additional pay for their teaching load, their work in committees (e.g. master or PhD defence), as well as, from research projects. Additional incentives for the entire group are available for a publication. An additional motivation is the award of the best lecturer of the year. On the contrary, no sanctions or cuts are in place at VNUHCM-US.

The expert panel is also interested if the contracts of the teaching staff are tenured. The teaching staff answers, that, according to the Vietnamese law, there is no option for a tenure. New employees normally receive short contracts, which, as a rule, are renewed annually. After several years and receiving positive reviews in the evaluations, the contract issued for a longer period. These long-term contracts are only terminated in rare cases, the reason for which includes poor performance.

The expert panel further raises the topic of staff exchange. The teaching staff of the programme *Mathematics* state, they have an active exchange and joint programmes with universities in France in several fields of applied mathematics. Annually, they receive at least five professors from France, who teach a two-hour course. Lecturers from the faculty also go abroad or stay for short-term exchange at other universities in Vietnam. The teaching staff from the programme *Physics* and ETE report to participate also in short-term exchange programmes, but do not mention regular exchange programme. The teaching staff describe its good connections to international universities, which is based on the fact that a high number of lecturers did their PhD programme abroad (especially in *Physics* and *Mathematics*).

In the discussion with the teaching staff, the experts also ask about student support of students. Students can either directly contact the lecturers or the teaching assistants directly for questions and counselling. In addition, the students of each semester have the opportunity to talk to an academic advisor. For a group of 200 students, they have access to eight advisors. These academic advisors offer office hours for the students or they can be contacted via an online form. The academic advisors can be approached for career advice and support the students further in choosing their specialization and the most suitable elective modules.

In the discussion, especially the teaching staff of the bachelor's programme ETE points out, that they miss human resources, especially lecturers. The university has to compete with

the electronic and telecommunication business in Ho Chi Minh, which offer considerably higher salaries than the university.

In general, the experts have a positive impression of the composition, professional orientation, and qualifications of the teaching staff in all three bachelor's programmes. Its qualification ensures a successful teaching, as well as, research. Lecturers have the opportunity to further develop their professional and didactic skills and are supported in using corresponding offers. The experts reviewed the evaluations and acknowledge that the didactic skills of the lecturer are regularly reviewed. Nevertheless, the experts also identify a significant demand for more lecturers. The expert panel suggests the university to consider non-material incentives in order to motivate people to consider a teaching job at the university. They additionally suggest considering inviting collaborations from the industry to teach elective modules to strengthen the connection to the industry and relieve the teaching load of the lecturers. Furthermore, they recommend expanding the professional development opportunities of their teaching staff.

Criterion 3.2 Funds and equipment

Evidence:

- Self-assessment report
- Visitation of the laboratories during the audit
- Specific information on the laboratory equipment requested during the audit
- Discussions during the audit

Preliminary assessment and analysis of the peers:
The VNUHCM-US has two campuses in greater Ho Chi Minh City; one is inside the city centre at District 5 whereas the other one is 20 km apart in Thu Duc – Di An, Binh Duong province. The university has classrooms and laboratories at both locations for all bachelor's programmes under review. Classrooms are suited to host large groups in the foundational classes, as well as, suitable smaller rooms for specialized modules. The campuses are covered by Wi-Fi, which is freely accessible to the entire staff and students. While students start their studies mainly at the campus at Thu Duc, specialization classes and advances classes usually take place at the downtown campus in District 5.

The main library is located at the campus in District 5 and focuses on supporting the research and teaching activities. The library has an annual budget to maintain, update, and modernize its collection. It offers books, journals, theses, scientific reports, e-books and

online data. This includes subscriptions to the major scientific journals. A second library is available at the campus outside of Ho Chi Minh City.

Each faculty further receives certain types of funding from the university. These include funds for operating expenses to purchase equipment and stationary, management funds to support management tasks, faculty office expenses, and honour programme funds to support students in the honour programme.

Computer classrooms are available for all study programmes. In addition, the bachelor's programme *Physics* has access to twelve different laboratories including an Optics Lab, Nuclear Physics Labs and Physics and Electronics Engineering Lab. The bachelor's programme ETE also uses general and specialized laboratories; specialized laboratories include equipment to work on digital signal processing and embedded systems.

In the discussion of the expert panel with the teaching staff, they address the topic of resources and equipment. The teaching staff from the programme ETE states that their laboratories are acceptable, but they are constantly looking for more advanced equipment. Within research projects, they normally seek to use equipment outside the university. The teaching staff of the programme *Physics* is satisfied with their equipment as it allows them to do their research. Yet, they admit, their scientific output could be higher if they had access to more modern equipment and therefore they would wish the university and the government would support this expansion. The teaching staff further explains that, to update their equipment, they have to submit a project proposal to the government. In this way, the Faculty of Physics and Engineering Physics was able to fund a new Raman spectroscope and new material in the field of nanotechnology. The teaching staff of the programme *Mathematics* tells the experts that they usually get two to three projects funded by the university annually. They have, however, many lecturers in many fields of mathematics. Researchers in some fields of mathematics have difficulties acquiring external funding from companies, especially in the non-applied fields of mathematics. The teaching staff of the programme ETE mention that they have several government-funded projects, with Intel on microchip development. They purchase most equipment in their faculty from project money; however, additional sponsoring from companies is also common practice.

The students say that they are satisfied with the laboratory equipment. They further agree, the laboratory courses deepened their knowledge in this field. The students verify, that they have access to software to conduct independent research is adequate. In special cases, the lecturers support the students. One student mentions that in order to train a neural network on a larger set of data they asked the lecturer, who had access to a larger server. Answering the expert's question about access to literature, the students admit that

it can be difficult to have access to all journals and articles. However, the lecturers help them to access the articles of their interest.

The expert panels concludes that the financial resources and the available equipment form a solid basis for the education of the students in these degree programmes. However, they note that office and laboratory spaces is limited that some of the equipment is aged. They specify, in their opinion, the laboratories in the program ETE should provide hands-on training to all undergraduate ETE-students on the following topics: (1) generation and visualisation of both analogue and digital signals, (2) spectral analysis (3) application of vector-network-analysis in characterising RF-Signals, and (4) basic antenna and radio-link experiment. The experts therefore recommend updating the laboratory equipment in order to comply with international standards. In order to acquire or gain access to needed laboratory equipment, the experts suggest cooperating directly with their local industry partners who have already expressed willingness to support the university. This will also further strengthen the existing links with the industry.

Final assessment of the peers after the comment of the Higher Education Institution regarding criterion 3:

The expert panel considers the new plans of VNUHCM-US concerning staff development and inviting external lecturers as positive. They further state that they indent to increase the collaboration in reference to shared equipment within the universities of the Vietnamese National University Ho Chi Minh City system. In addition, they state to intent renewing their laboratory equipment and sharing equipment with stakeholders. The experts emphasize the importance of staff development, laboratory equipment and industry collaborations for the future of these programs and faculties and therefore all recommendations of criterion 3 remain in place.

4. Transparency and documentation

Criterion 4.1 Module descriptions

Evidence:

- Self-assessment reports
- Module handbooks of each study programme
- Discussion during the audit

Preliminary assessment and analysis of the peers:
The HEI states, the module descriptions follow a standardized template, which includes the following information: title of the module, course code, person(s) responsible, course language, workload, number of credits, course learning outcomes, course content, assessment components, examination form, learning materials, and reading list. A syllabus is written for each module every semester, which is checked by the faculty's Scientific and Academic Council. The syllabus is shared with the students online and on the department's web page.

In the opinion of the experts, the module handbooks are neither consistent across the programmes nor within one programme. In addition, information is missing in some module descriptions (e.g. examination form, workload, didactical instruments, or lecturer). The programme coordinators explain, the study programme under review exist for a long time and are, therefore, undergoing constant development. This also led to the use of different templates for the module descriptions, which might not have been updated in selected cases. The programme coordinators admit and they did not have a chance to conduct a thorough revision of the course module handbooks. The teaching staff further confirms to the experts, that the module "seminar" is missing in all module handbooks. The expert panel therefore considers the module handbooks are in need of revision. They summarise that the module handbooks should follow one template and should contain information on: module title, person(s) responsible for each module, teaching method(s), credits and workload (Vietnamese and ECTS credit points), intended learning outcomes, module content, admission and examination requirements, form(s) of assessment and details explaining how the module mark is calculated, recommended literature, and date of last amendment made. Most important, it needs to be ensured, that at least one lecturer is responsible for each module offered.

Criterion 4.2 Diploma and Diploma Supplement

Evidence:

- Self-assessment report
- Diploma and diploma supplement
- Example of a transcript of records

Preliminary assessment and analysis of the peers:
The VNUHCM-US issues a diploma to students who have successfully completed their studies. The diploma is issued in English and Vietnamese and lists the name of the HEI, the type of training, the basic information of the students as well as the student's academic rating.

An additional transcript of records is issued in Vietnamese, which lists all courses, their amount of credits and the grade of the students. Transcripts in English are issued upon request.

Graduation at VNUHCM-US takes place in March and August each year. Students need to apply to the office of Academic Affairs, which needs to verify the completion of the studies of each student.

In the opinion of the students, the diploma supplement and the transcript of records are very important when submitting their CV. They tell the expert panel, that during applications, the interviewer often want to know, what they specifically learned and which courses they had during their studies.

In conclusion, the expert panel finds that the diploma is issued together with a diploma supplement and a transcript of records. These documents provide information on the student's qualifications profile and individual performance, as well as, the classification of the degree programme with regard to the respective education system. The experts acknowledge that the grades of all modules are individually presented. However, the experts miss an overview of the objectives and learning outcomes of the study programme in the diploma supplement. Additionally, neither the diploma supplement nor the transcript of records contains any information on how the final grade is calculated. Also, no information on the awarded ECTS credits points is stated in the transcript of records. The experts further recommend issuing the diploma supplement in both English and Vietnamese.

Criterion 4.3 Relevant rules

Evidence:

- Self-assessment report
- Web page programme Mathematics https://math.hcmus.edu.vn/en/
- Web page programme Physics https://phys.hcmus.edu.vn/
- Web page programme Electronics & Telecommunications Engineering http://www.fetel.hcmus.edu.vn/en/electronics/
- University web page https://hcmus.edu.vn/
- Study regulations
- Examination regulations
- Discussion during the audit

Preliminary assessment and analysis of the peers:
VNUHCM-US issues regulations and policies on the rights and obligations of staff and students. These include admission regulations, study regulations, and examination regulations. University bodies control, on different levels, how the rules and regulations are maintained and decide on the necessity of updates. VNUHCM-US communicates all rules with staff and students. The university shares information in the orientation phases with students. Additionally, all rules and regulations are posted online on the web pages of the university and their faculties. Furthermore, offices at university and faculty level gives advice upon requests.

The experts reviewed the rules and regulations of the VNUHCM-US. They gain the impression, that the rights and duties of both the HEI and students are clearly defined and binding (guidelines, statutes etc.). All relevant course-related information is available in the language of the degree programme and accessible for everyone involved. Nevertheless, the experts consider the web page of the university to require a thorough update in Vietnamese and English. Likewise, the web pages of the study programmes should be maintained on a regular basis.

Final assessment of the peers after the comment of the Higher Education Institution regarding criterion 4:

The statement of VNUHCM-US does not contain any passages on the requirement and recommendation of criterion 4. Therefore, the experts continue to issue the requirement A2, A3 and A4, as well as, E8.

5. Quality management: quality assessment and development

Criterion 5 Quality management: quality assessment and development

Evidence:

- Self-assessment report
- Evaluation results of student surveys
- Stakeholder survey report including evaluations among lecturers, enterprises, alumni and final year students
- Statistical data on student progress and graduation

- Discussion during the audit

Preliminary assessment and analysis of the peers:
The HEI has developed its own internal and an external quality assurance system, which is managed by the Office of Educational Testing and Quality Assurance. While the external quality assurance system focuses mainly on accreditations and reviews, the internal quality assurance system conducts a range of surveys to collect data on the university, the study programmes, modules, and its employees. The collection and analysis from stakeholders include faculty, students, alumni, and employers of an individual study programme. The Office of Educational Testing and Quality Assurance conduct the stakeholders' surveys annually. Moreover, student feedback is collected on each module each semester using an online system, which includes their opinion on the lecturer and the content of the module. The Office of Educational Testing and Quality Assurance processes and analyses the data and sends the results to the facilities. Students' satisfaction levels on modules and lecturers are further discussed among the board of deans of the faculties, who are responsible for taking action if the satisfaction rate drops below 50%. Annual feedback is also collected from recently graduated students, particularly on their employment status and satisfaction.

In addition, the university organizes a meeting to initiate a direct dialogue between students and the board of presidents, the deans of the faculty and relevant offices.

Individual strategies of quality assurance can further be developed within each faculty. The Faculty of Mathematics closely monitors and evaluates trends in society, which caused them to introduce a new study programme on data science in 2019. The study programme was a joint effort of lecturers, departments, deans, stakeholders as well as offices on university levels. The programme coordinators involve enterprises as employers in this process while also comparing the curriculum with similar national and international programmes. The Faculty of Physics and Engineering Physics has a separate programme to monitor the graduate profiles to match the demand of the stakeholders. A similar survey is also conducted to evaluate the satisfaction of the bachelor's programme ETE of students, student employment and enterprise satisfaction, as well as, satisfaction of the teaching staff and scientific research opportunities.

The expert panel is interested in the composition of the different committees and on the selection of their members. The representatives of the rector's office comment, that the committees of Science and Education are not elected, but selected. Its members comprise the deans of the different faculties, all professors of the university, the rector's board and the heads of the departments. This committee normally has around 50 members whereas

other committees at the faculty level, such as the Scientific Academic Committee, have about 30 members.

The experts further ask how the HEI monitors the average study duration. According to the representatives of the rector's office, the university tracks the total study period of each student. This is a firm basis for the statement that 50–60% of the students graduate within four years. The maximum duration allowed is eight years before students are ex-matriculated. Most students, whose study length exceeds the average duration, have problems to conclude their English proficiency test, which is mandatory in the three bachelor degree programmes under review (see criterion 1.3).

Moreover, the representatives of the Office of Testing and Quality Assurance confirm to the expert panel that they conduct surveys on the student satisfaction regularly each semester. Additionally, distributes questionnaires among the lecturers each year. The questionnaires used are reviewed annually, and questions are modified, if necessary. In addition, VNUHCM-US collects feedback from stakeholders and alumni. The students confirm that they are invited to join an online survey by the end of each course; these questionnaires contain questions on the content of the class, as well as, the lecturer. The expert panel addresses the topic of quality assurance also with the teaching staff. The teaching staff confirms to receive the results of the evaluations of their modules each semester. These surveys also contain questions on the lecturer and the teaching methodology. In addition, the lecturers fill out a self-evaluation form each year, which is discussed in a faculty meeting to receive feedback from their colleagues in the department.

In the discussion, the representatives from the rector's office explain to the experts, that the curriculum of each study programme undergoes a detailed review every other year. In this process, the evaluation results of students, lecturers, and stakeholders are considered. All results of the different regularly conducted surveys are discussed within a scientific committee, who additionally compares the programme content and modules to international universities. The results are presented to the faculty, who decides on a plan for further development of the programme. The final plan for improvement is then presented to the students and stakeholders. The representatives of the rector's office bring to the attention of the experts that they organize an event between the students and the dean of each faculty at the end of each semester in order to receive direct feedback from the students and provide a platform for them to ask their questions. The programme coordinators from the ETE programme add that specify they collect feedback from industry and other commercial employers. The questionnaires also include feedback on the objectives and the programme learning outcomes of the study programme. In a personal meeting with representatives of the industry, they further discuss on how to improve the learning outcomes to match the current demand on the job market. The alumni further confirm that they are

also invited to join a survey, which includes questions on their current employment and salary. The alumni also mention to the experts that topics criticized in their evaluations were changed in the following years indeed. One example was the request for an elective course on machine learning, which is now integrated in the curriculum.

The experts summarise that all three study programs under review are subject to periodical internal quality assurance, which includes all stakeholders. The results of these processes are incorporated into the continuous development of the programme. The experts formulate the opinion that the results are derived from the various quality assurance instruments used (various survey formats, student statistics, etc.), they miss, however, methods to monitor the quality of the modules over time as required by the ASIIN criteria. The experts consequently propose to consider alternatives evaluations that allow for quantitative-based questions in the survey, and, in turn, to track the changes over time.

Final assessment of the peers after the comment of the Higher Education Institution regarding criterion 5:

The university states that they already conduct regular surveys with internal and external stakeholders showing overall great satisfaction with the three bachelor programmes under review. In addition, the statement of VNUHCM-US confirms that the university plans to develop a plan to monitor the modules in detail. In the opinion of the expert panel, this is a positive development; however until monitoring plan is presented, the requirement A5 remains in place.

D Additional Documents

No additional documents needed.

E Comment of the Higher Education Institution (24.02.2023)

The following quotes the comment of the institution:

The feedback from VNUHCM-US

Criterion 1.3.

The three programs have already integrated English skills and presentation skills into courses. We also have plans to increase the length of English instruction and improve the weighting of relevant skills assessment across the curriculum. We will consider opening a new subject on soft skills as suggested by ASIIN.

Criterion 2.

For the Mathematics program, we will be incorporating a requirement that all students must be involved in a final thesis or project in order to demonstrate their ability to work independently on a task at the intended level of the degree programme.

For the Physics & ETE program, students must choose a final graduation thesis or a final project. The final project is also called the "final seminar", as our module catalog may cause confusion about the content. We will update the name of this course from "final seminar" to "final project" in the module catalog of the next enrollment course. The implementation process of the final seminar is precisely the same as the graduation thesis, concluding the process of assigning topics, methods of implementation, and the assessment committee, except that the academic content requirements are lower than that of the thesis.

Criterion 3.1 Staff and Development

- Lecturers attending courses to improve their qualifications will be reimbursed 100% of the tuition fees for master's and doctoral degrees at domestic training institutions.

- We have invited enterprises to teach partly in several courses. We will continue to strengthen invitations for cooperation from enterprises and foreign professors.

Criterion 3.2 Funds and equipment

As a member of VNUHCM system, the university use the policy of sharing expensive new equipment within the VNUHCM. We will also continue to work with stakeholders on the need to increase investment in equipment to serve the learning needs of students as well as the research needs of faculty members.

Criterion 5.

The university has already established a system of surveys involving all relevant stakeholders after each semester and has requested faculties to regularly adjust and update their plans to ensure quality assurance.

The results almost show that student satisfaction is higher than expected (60%). Currently, we just only prioritize handling exceptional cases (under 60%). So far, we have provided general supervision for theoretical and practical courses. We are working on a detailed monitoring plan for each course to enhance quality assurance.

F Summary: Peer recommendations (01.03.2023)

Taking into account the additional information and the comments given by 3 the peers summarize their analysis and final assessment for the award of the seals as follows:

Degree Programme	ASIIN-seal	Subject-specific label	Maximum duration of accreditation
Ba. Mathematics	With requirements for one year	-	30.09.2028
Ba Physics	With requirements for one year	-	30.09.2028
Ba Electronics and Telecommunications	With requirements for one year	-	30.09.2028

Requirements

A 1. (ASIIN 2) The study programmes need to include a mandatory final thesis or final project.

A 2. (ASIIN 4.1) The module handbooks of all bachelor programmes need to be revised using one single template. All information is required in all fields of the template.

A 3. (ASIIN 4.2) The diploma supplement and transcript of records require additional information. The diploma supplement needs information on the objectives, learning outcomes of the programme and on the grading system. The transcript of records should contain either information on the workload in ECTS credit points or information on the conversion among credit point systems.

A 4. (ASIIN 4.3) The website of the University and each study programme needs to be updated to give information to all stakeholders including especially admission, programme overview and curricula.

A 5. (ASIIN 5) Regular evaluation should include quantitative questions, which allow to measure and monitor the quality of modules over time.

Recommendations

E 1. (ASIIN 1.3) It is recommended to raise the English proficiency of students and staff by considering establishing new courses on English conversation, presentation as well as technical English in the different study fields.

E 2. (ASIIN 1.3) It is recommended to improve the presentation skills of the students, e.g. introducing new seminar modules.

E 3. (ASIIN 1.3 and 2) It is recommended to review the quality of lectures and exams to reach comparable standards.

E 4. (ASIIN 3.1) It is recommended to expand the professional development opportunities of the staff.

E 5. (ASIIN 3.1) It is recommended to consider non-material incentives for all lecturers in order to expand the teaching staff.

E 6. (ASIIN 3.1 and 3.2) It is recommended to increase the cooperations with stakeholders by inviting them to give lectures at the university and share equipment for the laboratories.

E 7. (ASIIN 3.2) It is recommended to update the laboratory equipment in order to comply with international standards.

E 8. (ASIIN 4.3) It is recommended to create flow charts of the study plans to visualize for the students their path through the study programmes.

G Comment of the Technical Committees

Technical Committee 02 – Electrical Engineering/Information Technology (06.03.2023)

Assessment and analysis for the award of the ASIIN seal:

The Technical Committee discusses the accrediting procedure and follows the assessment of the peers without any changes.

The Technical Committee 02 – Electrical Engineering/Information Technology recommends the award of the seals as follows:

Degree Programme	ASIIN-seal	Subject-specific label	Maximum duration of accreditation
Ba Electronics and Telecommunications Engineering	With requirements for one year	-	30.09.2028

Requirements

A 1. (ASIIN 2) The study programmes need to include a mandatory final thesis or final project.

A 2. (ASIIN 4.1) The module handbooks of all bachelor programmes need to be revised using one single template. All information is required in all fields of the template.

A 3. (ASIIN 4.2) The diploma supplement and transcript of records require additional information. The diploma supplement needs information on the objectives, learning outcomes of the programme and on the grading system. The transcript of records should contain either information on the workload in ECTS credit points or information on the conversion among credit point systems.

A 4. (ASIIN 4.3) The website of the University and each study programme needs to be updated to give information to all stakeholders including especially admission, programme overview and curricula.

A 5. (ASIIN 5) Regular evaluation should include quantitative questions, which allow to measure and monitor the quality of modules over time.

Recommendations

E 1. (ASIIN 1.3) It is recommended to raise the English proficiency of students and staff by considering establishing new courses on English conversation, presentation as well as technical English in the different study fields.

E 2. (ASIIN 1.3) It is recommended to improve the presentation skills of the students, e.g. introducing new seminar modules.

E 3. (ASIIN 1.3 and 2) It is recommended to review the quality of lectures and exams to reach comparable standards.

E 4. (ASIIN 3.1) It is recommended to expand the professional development opportunities of the staff.

E 5. (ASIIN 3.1) It is recommended to consider non-material incentives for all lecturers in order to expand the teaching staff.

E 6. (ASIIN 3.1 and 3.2) It is recommended to increase the cooperations with stakeholders by inviting them to give lectures at the university and share equipment for the laboratories.

E 7. (ASIIN 3.2) It is recommended to update the laboratory equipment in order to comply with international standards.

E 8. (ASIIN 4.3) It is recommended to create flow charts of the study plans to visualize for the students their path through the study programmes.

Technical Committee 12 – Mathematics (06.03.2023)

Assessment and analysis for the award of the ASIIN seal:

The Technical Committee discusses the procedure and follows the assessment of the peers without any changes.

The Technical Committee 12 – Mathematics recommends the award of the seals as follows:

Degree Programme	ASIIN-seal	Subject-specific label	Maximum duration of accreditation
Ba Mathematics	With requirements for one year	-	30.09.2028

Requirements

A 1. (ASIIN 2) The study programmes need to include a mandatory final thesis or final project.

A 2. (ASIIN 4.1) The module handbooks of all bachelor programmes need to be revised using one single template. All information is required in all fields of the template.

A 3. (ASIIN 4.2) The diploma supplement and transcript of records require additional information. The diploma supplement needs information on the objectives, learning outcomes of the programme and on the grading system. The transcript of records

should contain either information on the workload in ECTS credit points or information on the conversion among credit point systems.

A 4. (ASIIN 4.3) The website of the University and each study programme needs to be updated to give information to all stakeholders including especially admission, programme overview and curricula.

A 5. (ASIIN 5) Regular evaluation should include quantitative questions, which allow to measure and monitor the quality of modules over time.

Recommendations

E 1. (ASIIN 1.3) It is recommended to raise the English proficiency of students and staff by considering establishing new courses on English conversation, presentation as well as technical English in the different study fields.

E 2. (ASIIN 1.3) It is recommended to improve the presentation skills of the students, e.g. introducing new seminar modules.

E 3. (ASIIN 1.3 and 2) It is recommended to review the quality of lectures and exams to reach comparable standards.

E 4. (ASIIN 3.1) It is recommended to expand the professional development opportunities of the staff.

E 5. (ASIIN 3.1) It is recommended to consider non-material incentives for all lecturers in order to expand the teaching staff.

E 6. (ASIIN 3.1 and 3.2) It is recommended to increase the cooperations with stakeholders by inviting them to give lectures at the university and share equipment for the laboratories.

E 7. (ASIIN 3.2) It is recommended to update the laboratory equipment in order to comply with international standards.

E 8. (ASIIN 4.3) It is recommended to create flow charts of the study plans to visualize for the students their path through the study programmes.

Technical Committee 13 – Physics (03.03.2023)

Assessment and analysis for the award of the ASIIN seal:

The Technical Committee discusses the procedure and concurs with the assessment of the peers.

The Technical Committee 13 – Physics recommends the award of the seals as follows:

Degree Programme	ASIIN-seal	Subject-specific label	Maximum duration of accreditation
Ba Physics	With requirements for one year	-	30.09.2028

Requirements

A 1. (ASIIN 2) The study programmes need to include a mandatory final thesis or final project.

A 2. (ASIIN 4.1) The module handbooks of all bachelor programmes need to be revised using one single template. All information is required in all fields of the template.

A 3. (ASIIN 4.2) The diploma supplement and transcript of records require additional information. The diploma supplement needs information on the objectives, learning outcomes of the programme and on the grading system. The transcript of records should contain either information on the workload in ECTS credit points or information on the conversion among credit point systems.

A 4. (ASIIN 4.3) The website of the University and each study programme needs to be updated to give information to all stakeholders including especially admission, programme overview and curricula.

A 5. (ASIIN 5) Regular evaluation should include quantitative questions, which allow to measure and monitor the quality of modules over time.

Recommendations

E 1. (ASIIN 1.3) It is recommended to raise the English proficiency of students and staff by considering establishing new courses on English conversation, presentation as well as technical English in the different study fields.

E 2. (ASIIN 1.3) It is recommended to improve the presentation skills of the students, e.g. introducing new seminar modules.

E 3. (ASIIN 1.3 and 2) It is recommended to review the quality of lectures and exams to reach comparable standards.

E 4. (ASIIN 3.1) It is recommended to expand the professional development opportunities of the staff.

E 5. (ASIIN 3.1) It is recommended to consider non-material incentives for all lecturers in order to expand the teaching staff.

E 6. (ASIIN 3.1 and 3.2) It is recommended to increase the cooperations with stakeholders by inviting them to give lectures at the university and share equipment for the laboratories.

E 7. (ASIIN 3.2) It is recommended to update the laboratory equipment in order to comply with international standards.

E 8. (ASIIN 4.3) It is recommended to create flow charts of the study plans to visualize for the students their path through the study programmes.

H Decision of the Accreditation Commission (24.03.2023)

Assessment and analysis for the award of the ASIIN seal:

The Accreditation Commission discusses the accreditation procedure and follows the assessment of the peers and the Technical Committees without any changes.

The Accreditation Commission decides to award the following seals:

Degree Programme	ASIIN-seal	Subject-specific label	Maximum duration of accreditation
Ba. Mathematics	With requirements for one year	-	30.09.2028
Ba Physics	With requirements for one year	-	30.09.2028
Ba Electronics and Telecommunications Engineering	With requirements for one year	-	30.09.2028

Requirements

A 1. (ASIIN 2) The study programmes need to include a mandatory final thesis or final project.

A 2. (ASIIN 4.1) The module handbooks of all bachelor programmes need to be revised using one single template. All information is required in all fields of the template.

A 3. (ASIIN 4.2) The diploma supplement and transcript of records require additional information. The diploma supplement needs information on the objectives, learning outcomes of the programme and on the grading system. The transcript of records should contain either information on the workload in ECTS credit points or information on the conversion among credit point systems.

A 4. (ASIIN 4.3) The website of the University and each study programme needs to be updated to give information to all stakeholders including especially admission, programme overview and curricula.

A 5. (ASIIN 5) Regular evaluation should include quantitative questions, which allow to measure and monitor the quality of modules over time.

Recommendations

E 1. (ASIIN 1.3) It is recommended to raise the English proficiency of students and staff by considering establishing new courses on English conversation, presentation as well as technical English in the different study fields.

E 2. (ASIIN 1.3) It is recommended to improve the presentation skills of the students, e.g. introducing new seminar modules.

E 3. (ASIIN 1.3 and 2) It is recommended to review the quality of lectures and exams to reach comparable standards.

E 4. (ASIIN 3.1) It is recommended to expand the professional development opportunities of the staff.

E 5. (ASIIN 3.1) It is recommended to consider non-material incentives for all lecturers in order to expand the teaching staff.

E 6. (ASIIN 3.1 and 3.2) It is recommended to increase the cooperations with stakeholders by inviting them to give lectures at the university and share equipment for the laboratories.

E 7. (ASIIN 3.2) It is recommended to update the laboratory equipment in order to comply with international standards.

E 8. (ASIIN 4.3) It is recommended to create flow charts of the study plans to visualize for the students their path through the study programmes.

I Fulfilment of Requirements (22.03.2024)

Analysis of the experts and the Technical Committees (12.03.2024)

Requirements

For both degree programmes

A 1. (ASIIN 2) The study programmes need to include a mandatory final thesis or final project.

Initial Treatment	
Experts	Fulfilled. Justification: The university has presented conclusive evidence showing that the graduation project/final project is now mandatory in all three study programmes. Evidences include official documents on the study programmes including curricula and documents on the thesis defence.
TC 02	Fulfilled Vote: unanimous Justification: The TC 02 follows the vote of the experts.
TC 12	Fulfilled Vote: unanimous Justification: The TC 12 follows the vote of the experts.
TC 13	Fulfilled. Vote: unanimous Justification: The Technical Committee discusses the procedures and follows the assessment of the auditors.
AC	Fulfilled Vote: unanimous Justification: The AC follows the vote of the experts and the TCs.

A 2. (ASIIN 4.1) The module handbooks of all bachelor programmes need to be revised using one single template. All information is required in all fields of the template.

Initial Treatment	
Experts	Fulfilled. Justification: A new module handbook (module catalogue) for each study programme was submitted. Each includes a table of content and module descriptions for each mandatory and elective module. The experts approve that similar templates were used in all module handbooks.
TC 02	Fulfilled Vote: unanimous Justification: The TC 02 follows the vote of the experts.
TC 12	Fulfilled Vote: unanimous Justification: The TC 12 follows the vote of the experts.
TC 13	Fulfilled. Vote: unanimous Justification: The Technical Committee discusses the procedures and follows the assessment of the auditors.
AC	Fulfilled Vote: unanimous Justification: The AC follows the vote of the experts and the TCs.

A 3. (ASIIN 4.2) The diploma supplement and transcript of records require additional information. The diploma supplement needs information on the objectives, learning outcomes of the programme and on the grading system. The transcript of records should contain either information on the workload in ECTS credit points or information on the conversion among credit point systems.

Initial Treatment	
Experts	Fulfilled. Justification: The experts acknowledge that the university has issues new Diploma Supplement including a Transcript of Records. These new documents list the ECTS credit equivalent of each course as well as the grade. Explanation of the grading score is given; additionally, the new Diploma Supplements give information on the students GPA and thesis grade.
TC 02	Fulfilled Vote: unanimous Justification: The TC 02 follows the vote of the experts.
TC 12	Fulfilled Vote: unanimous Justification: The TC 12 follows the vote of the experts.
TC 13	Fulfilled. Vote: unanimous

	Justification: The Technical Committee discusses the procedures and follows the assessment of the auditors.
AC	Fulfilled Vote: unanimous Justification: The AC follows the vote of the experts and the TCs.

A 4. (ASIIN 4.3) The website of the University and each study programme needs to be updated to give information to all stakeholders including especially admission, programme overview and curricula.

Initial Treatment	
Experts	Fulfilled. Justification: The experts appreciate the newly designed university webpage in English. The university has redesigned their online presence offering now information on each study programs. The experts recommend continuing to improve the webpage as they still could not find information for international students and encountered some broken links. Nevertheless, the experts are satisfied with all improvements the university has done so far and are convinced, the university will work on these minor issues in the near future.
TC 02	Fulfilled Vote: unanimous Justification: The TC 02 follows the vote of the experts.
TC 12	Fulfilled Vote: unanimous Justification: The TC 12 follows the vote of the experts.
TC 13	Fulfilled. Vote: unanimous Justification: The Technical Committee discusses the procedures and follows the assessment of the auditors.
AC	Fulfilled Vote: unanimous Justification: The AC follows the vote of the experts and the TCs.

A 5. (ASIIN 5) Regular evaluation should include quantitative questions, which allow to measure and monitor the quality of modules over time.

Initial Treatment	
Experts	Fulfilled. Justification: The university has submitted the statistical analysis of the students' evaluations of the last two semesters. The questionnaires clearly used quantitative questions providing data to

	track the differences in both semesters. The experts are very satisfied with these new surveys and are convinced that these will allow the university to better track changes in a long-time perspective.
TC 02	Fulfilled Vote: unanimous Justification: The TC 02 follows the vote of the experts.
TC 12	Fulfilled Vote: unanimous Justification: The TC 12 follows the vote of the experts.
TC 13	Fulfilled. Vote: unanimous Justification: The Technical Committee discusses the procedures and follows the assessment of the auditors.
AC	Fulfilled Vote: unanimous Justification: The AC follows the vote of the experts and the TCs.

Decision of the Accreditation Commission (22.03.2024)

Degree programme	ASIIN-label	Subject-specific label	Accreditation until max.
Ba Mathematics	All requirements fulfilled.		30.09.2028
Ba Physics	All requirements fulfilled.		30.09.2028
Ba Electronics and Telecommunications Engineering	All requirements fulfilled.		30.09.2028

Appendix: Programme Learning Outcomes and Curricula

According to self-assessment report the following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved by the Bachelor degree programme *Mathematics*:

Objective 1	Ability to summarise basic scientific and social knowledge and foundational mathematical knowledge
Objective 2	Commanding fundamental knowledge of mathematics
Objective 3	In-depth knowledge in a specialization
Objective 4	Broad knowledge in certain related areas
Objective 5	Precise and rigorous thinking, methods of scientific approach, flexible adaption of mathematical knowledge methods and tools to solve practical problems
Objective 6	Skills for independent works and group works, communicating, self-learning, absorbing new knowledge, time and resource management, systematic consideration, proactive creative and cooperating spirits, social consciousness, and adaption

The intended learning outcomes (ILO) summarized below:

Label	**Learning outcomes**
ILO 1	General education: Able to summarize and utilize general knowledge on politics, economics, society, natural sciences , learning skills, foreign languages and health.
ILO 2	General professional education: Achieved required competency in multivariable calculus, linear algebra, introductory algebraic structures, basic analysis on metric and normed spaces, solving concrete differential equations and mathematical models, introductory mathematical software, and introductory computer programming.
ILO 3	Foundational professional education: Achieved required competency in at least one of the following Concentrations: Mathematics, Computer Science, Quantitative Finance, Mathematical Education, through required courses of the concentration.

ILO 4	Professional education: Achieved in-depth knowledge through required and optional courses of at least one Specialization of the Concentration. Qualified students are allowed to take a seminar course and compose a graduation thesis.
ILO 5	Broad and auxiliary education: complete a mandatory number of courses outside of the Specialization and a minimum number of credits.
ILO 6	Computer skills: Able to utilize to communicate, search, access information and study resources, able to compose mathematical texts in accordance with professional practice, command at least one programming language.
ILO 7	Professional communication skills: experienced project writings and presentations.
ILO 8	Foreign language skill: achieved university's required competency in English language, able to utilize professional documentation in English, some students experienced professional classes studied in English.
ILO 9	Soft skills: acquired skills, habits, and inner resources for self-study, social communication, group work. Participated in professional and extracurricular activities.
ILO 10	Way of thinking: developed rigorous, precise, reflective thinking; independent and creative mind; social consciousness; realization of roles of mathematics and computer science in life; figuring one own place in society.

The following **curriculum** is presented:

General Education (Year 1 and 2)

Course Code	Course Name	Credit	Mandatory/Optional	Semester
BAA00101	Philosophy Marx-Lenin	3	Mandatory	1
BAA00102	Marxist-Leninist Political Economic	2	Mandatory	1
BAA00011	English 1	3	Mandatory	1
BAA00021	Physical education 1	2	Mandatory	1
BAA00030	Defense Education	4	Mandatory	1
CSC00003	General Information	3	Mandatory	1
BAA00012	English 2	3	Mandatory	2

BAA00103	Scientific Socialism	2	Mandatory	2
BAA00104	History of the Vietnamese Communist Party	2	Mandatory	2
BAA00005	General Economic	2	Optional	2 (choose 1 of 3)
BAA00006	General Psychology	2	Optional	
BAA00008	Team-working and learning skills	2	Optional	
GEO00002	Earth Science	2	Optional	2 (choose 2 of these courses)
ENV00002	General environment	2	Optional	
ENV00003	Human and Environment	2	Optional	
BAA00022	Physical education 2	2	Mandatory	2
MTH00055	Basic Computer Programming	4	Mandatory	2
BIO00001	General Biology 1	3	Optional	3 (choose 4 of these courses)
BIO00002	General Biology 2	3	Optional	
BIO00081	Labwork on General Biology 1	1	Optional	
BIO00082	Labwork on General Biology 2	1	Optional	
CHE00001	General Chemistry 1	3	Optional	
CHE00002	General Chemistry 2	3	Optional	
CHE00081	General Chemistry Laboratory 1	2	Optional	
CHE00082	General Chemistry Laboratory 2	2	Optional	

PHY00001	General physics 1 (Mechanics and Thermodynamics?)	3	Optional	
PHY00002	General physics 2 (Electromagnetic - Optics)	3	Optional	
PHY00081	Labwork on General Physics	2	Optional	
BAA00013	English 3	3	Mandatory	3
BAA00003	Ho Chi Minh's Thoughts	2	Mandatory	4
BAA00014	English 4	3	Mandatory	4
GEO00002	Earth Science	2	Optional	4 (choose 2 of these courses)
ENV00002	General environment	2	Optional	
ENV00003	Human and Environment	2	Optional	
MTH10617	Surveys of Mathematics, Computer Science, and specializations	2	Optional	
BAA00004	Introduction to Vietnamese Law System	3	Mandatory	5

Mathematics – Computer Sciences – Natural Sciences

NO.	COURSE CODE	COURSE NAME	Starting semester
1	MTH00010	Analysis 1A	1
2	MTH00011	Differential and Integral Calculus, Calculus 1A	1
3	MTH00012	Analysis 2A	3
4	MTH00013	Differential and Integral Calculus, Calculus	2

NO.	COURSE CODE	COURSE NAME	Starting semester
1	MTH00010	Analysis 1A	1
		2A	
5	MTH00014	Analysis 3A	3
6	MTH00015	Analysis 4A	4
7	MTH00030	Linear Algebra	1
8	MTH00031	Higher Algebra	2
9	MTH00055	Basic Computer Programming	2
10	MTH00083	Linear Algebra Practice	1
11	MTH00084	Higher Algebra Practice	2
12	MTH00087	Computational Softwares Laboratory	3

Basic knowledge

NO.	COURSE CODE	COURSE NAME	Starting semester
a. Mathematics (Mechanics, Algebra, Analysis, Numerical Analysis, Optimization, Probability and Statistics)			
Students choose 05 courses (19 credits)			
1	MTH10401	Measure Theory and Probability	3,5
2	MTH10402	Algebra A2	3,5,7
3	MTH10403	Functional Analysis	4,6,8
4	MTH10404	Mathematical Statistics	4,6,8
5	Choose 01 in 03 courses		
	MTH10405	Data Structure & Algorithm	3,5,7
	MTH10406	Discrete Mathematics	4,6,8
	MTH10407	Object Oriented Programming	4,6,8

b. Computer Sciences (Mathematical Methods in Computer Science, Applied Mathematical Computer Science, Data Science)			
Students choose 05 courses (19 credits)			
1	MTH10404	Mathematical Statistics	4,6,8
2	MTH10405	Data Structure & Algorithm	3,5
3	MTH10406	Discrete Mathematics	4,6
4	MTH10407	Object Oriented Programming	4,6
5	Choose 01 in 03 courses		
	MTH10401	Measure Theory and Probability	3,5,7
	MTH10402	Algebra A2	3,5,7
	MTH10403	Functional Analysis	4,6,8
c. Math Education (Didactics and Methodology of Mathematics Teaching)			
Students choose 05 courses (18 credits)			
1	MTH10110	Teaching Methods in Mathematics 1	4,5
2	MTH10111	Teaching Methods in Mathematics 2	4,5
3	MTH10401	Measure Theory and Probability	3,5,7
4	MTH10402	Algebra A2	3,5,7
5	MTH10403	Functional Analysis	4,6,8
d. Quantitative Finance (Mathematical Finance)			
Students choose 04 courses (15 credits)			
1	MTH10401	Measure Theory and Probability	3,5
2	MTH10402	Algebra A2	3,5,7
3	MTH10403	Functional Analysis	4,6,8
4	MTH10404	Mathematical Statistics	4,6

Specialized knowledge:

Mechanics Specialization

Required courses:

NO.	COURSE CODE	COURSE NAME	Starting semester
1	MTH10410	Numerical Analysis 1	4,6,8
2	MTH10413	Equations of Mathematical Physics	4,6,8
3	MTH10427	Theoretical Mechanics	5
4	MTH10428	Continuum mechanics	5
5	MTH10429	Finite element method	7
6	MTH10412	Complex variable function	4,6,8
7	MTH10434	Solid mechanics	6
8	MTH10435	Fluid mechanics	6

Elective courses:

NO.	COURSE CODE	COURSE NAME	Starting semester
1	MTH10430	Vibration and Stability Theory	5
2	MTH10520	Seminar on mechanics	6,7,8
3	MTH10521	Finite difference methods	6
4	MTH10524	Dynamics of Multibody Systems and Robotics	8
5	MTH10526	Random vibration	5
6	MTH10527	Aerodynamics	8
7	MTH10611	Symbolic programming for applied problems	6
8	MTH10613	Fracture mechanics	6
9	MTH10612	Introduction to mechanics	4

Algebra Specialization

Required courses:

NO.	COURSE CODE	COURSE NAME	Starting semester
1	MTH10418	Homological Algebra	6
2	MTH10419	Commutative algebra	5
3	MTH10420	Introduction of Ring Theory	5
4	MTH10421	Modern Algebra	4
5	MTH10422	Field and Galois Theory	6

Elective courses:

NO.	COURSE CODE	COURSE NAME	Starting semester
1	MTH10596	Group Theory	8
2	MTH10497	Representation Theory Of Finite Groups	7
3	MTH10498	Introduction To Number Theory	7
4	MTH10499	Theory Of Finite Fields	8
5	MTH10500	Modules And Applications	7
6	MTH10501	Seminar of Algebra	7
7	MTH10502	Graph Theory	7
8	MTH10503	Computer Algebra	6
9	MTH10504	Algebraic Graph Theory	8
10	MTH10505	Graded Algebras	6
11	MTH10506	Graph Algebras	7
12	MTH10507	An Introduction To Combinatorics	6
13	MTH10492	Algebraic Topology	8
14	MTH10601	A brief history of numbers and algebra	4

NO.	COURSE CODE	COURSE NAME	Starting semester
1	MTH10596	Group Theory	8
15	MTH10602	An Introduction To Division Rings	7
16	MTH10603	An introduction to group algebras	7

Analysis Specialization

Required courses:

NO.	COURSE CODE	COURSE NAME	Starting semester
1	MTH10408	Real Analysis	4,6,8
2	MTH10410	Numerical Analysis 1	4,6,8
3	MTH10411	Theory of Qualitative Differential Equations	5,7
4	MTH10412	Complex variable function	4,6,8
5	MTH10413	Equations of Mathematical Physics	5,7
6	MTH10414	Partial Differential Equations	6,8
7	MTH10415	Finite element analysis	6,8
8	MTH10417	Topology	5,7

Elective courses:

NO.	COURSE CODE	COURSE NAME	Starting semester
1	MTH10409	Nonlinear Functional Analysis	5,7
2	MTH10451	Analysis Seminar	6,7,8
3	MTH10460	Integral Transforms and Applications	
4	MTH10461	ill-posed problems	5,7
5	MTH10462	Measure Theory	
6	MTH10465	Integral-differential Equations	5,7

NO.	COURSE CODE	COURSE NAME	Starting semester
1	MTH10409	Nonlinear Functional Analysis	5,7
7	MTH10469	Bifurcation Of Differential Equations	
8	MTH10470	Stability Theory And Applications	
9	MTH10471	Multi-Valued Differential Equations	
10	MTH10473	Stochastic Differential Equations	
11	MTH10476	Harmonic Analysis	
12	MTH10478	Differential Topology	6,8
13	MTH10480	Differential Geometry	5,7
14	MTH10489	Numerical Method For Solving Inverse Problems	6,8
15	MTH10490	Nonlinear operators	6,8
16	MTH10491	Calculus of variation	5,7
17	MTH10492	Algebraic Topology	6,8
18	MTH10494	Theory of functions of several complex variables	5,7

Numerical Analysis Specialization

Required courses:

NO.	COURSE CODE	COURSE NAME	Starting semester
1	MTH10410	Numerical Analysis 1	6,8
2	MTH10414	Partial Differential Equations	6,8
3	MTH10415	Finite element analysis	6,8
4	MTH10408	Real Analysis	4,6,8
5	MTH10439	Numerical methods on linear algebra	5,7
6	MTH10444	Hyperbolic systems of conservation laws	6,8

7	MTH10445	Introduction to finite volume methods and their applications	6,8
8	MTH10610	Finite Difference Analysis	5,7
9	MTH10604	Numerical optimization	6,8

Elective courses:

NO.	COURSE CODE	COURSE NAME	Starting semester
1	MTH10436	Real Analysis	
2	MTH10440	Numerical Methods on Advanced Linear Algebra	
3	MTH10532	Seminar of Numerical Analysis	6,7,8
4	MTH10533	Numerical Analysis 2	5,7
5	MTH10535	Domain Decomposition Methods	
6	MTH10537	Computing and Simulation for PDEs with Julia	
7	MTH10552	Finite Volume Method for PDEs of Fluid Motion	

Optimization Specialization

Required courses:

NO.	COURSE CODE	COURSE NAME	Starting semester
1	MTH10446	Operations Research	5,7
2	MTH10447	Nonlinear Programming	4,6,8
3	MTH10615	Optimization models in Economics	5,7
4	MTH10449	Linear Programming	4,6,8
5	MTH10450	Numerical Method in Optimization	4,6,8
6	MTH10543	Introduction to Convex Analysis and Convex	5,7

NO.	COURSE CODE	COURSE NAME	Starting semester
1	MTH10446	Operations Research	5,7
		Programming	

Elective courses:

NO.	COURSE CODE	COURSE NAME	Starting semester
1	MTH10616	Seminar on optimization	4 đến 8
2	MTH10553	Multiobjective optimization	5,7
3	MTH10538	Applied Optimization	4,6,8
4	MTH10539	Advanced linear programming	5,7
5	MTH10540	Nonsmooth optimization: theory and numerical methods	4,6,8
6	MTH10541	Game Theory	4,6,8
7	MTH10544	Optimality conditions in nonsmooth optimization	5,7
8	MTH10545	Optimal control	5,7
9	MTH10614	Variational methods in optimization	4,6,8

Probability and Statistics Specialization

Required courses:

NO.	COURSE CODE	COURSE NAME	Starting semester
1	MTH10423	Probability theory	5,7
2	MTH10424	Mathematical Statistics	5,7
3	MTH10619	Multidimensional Statistical Analysis	6,8
4	MTH10426	Stochastic processes	6,8

Elective courses:

NO.	COURSE CODE	COURSE NAME	Starting semester
1	MTH10485	Time Series Analysis	5,7
2	MTH10508	Seminar of Probability and Statistics	7
3	MTH10509	Stochastic Models in Life Sciences	5,7
4	MTH10510	Statistics on Biology	5,7
5	MTH10511	Linear Statistical models	5,7
6	MTH10512	Statistics in Finance	5,7
7	MTH10513	Analysis of Statistical Data	5,7
8	MTH10514	Bayes Statistics	6,8
9	MTH10515	Non-Parametric Statistics	6,8
10	MTH10516	Basic Probability theory	4
11	MTH10517	Sampling Theory and Methods	5,7
12	MTH10518	Functional Analysis in Statistics	5,7
13	MTH10609	Nonparametric Tests	

Data Science Specialization

Required courses:

NO.	COURSE CODE	COURSE NAME	Starting semester
1	MTH10312	Introduction to Database systems	4
2	MTH10318	Artificial Intelligence	5
3	MTH10353	Introduction of Machine Learning	6
4	MTH10513	Analysis of Statistical Data	5
5	MTH10358	Data Mining	6
6	MTH10605	Python for Data Science	5,7

Elective courses:

NO.	COURSE CODE	COURSE NAME	Starting semester
1	MTH10322	Pattern Recognition	7
2	MTH10323	MultiDimensional Signal Processing	6
3	MTH10325	Algorithm Analysis	6
4	MTH10344	Database Management System	6
5	MTH10352	Parallel Computing	6
6	MTH10354	Introduction of Advanced Machine Learning	7
7	MTH10619	Multidimensional Statistical Analysis	6,8
8	MTH10450	Numerical Method in Optimization	4,6,8
9	MTH10485	Time Series Analysis	7
10	MTH10516	Basic Probability theory	4
11	MTH10606	Big Data Analytics	7
12	MTH10608	Data visualization	7
13	MTH10607	Numerical methods for data science	7
14	MTH10620	Seminar on Data Science	7

Mathematical Methods in Computer Science Specialization

Required courses:

NO.	COURSE CODE	COURSE NAME	Starting semester
1	MTH10317	Digital Image Analysis and Processing	5
2	MTH10318	Artificial Intelligence	5
3	MTH10319	Introduction to Cryptography	7
4	MTH10320	Digital Signal Processing	5
5	MTH10321	High Performance Computing	

NO.	COURSE CODE	COURSE NAME	Starting semester
1	MTH10317	Digital Image Analysis and Processing	5
6	MTH10322	Pattern Recognition	7
7	MTH10323	MultiDimensional Signal Processing	6
8	MTH10324	Algorithmic Number Theory	6
9	MTH10325	Algorithm Analysis	6

Elective courses:

NO.	COURSE CODE	COURSE NAME	Starting semester
1	MTH10346	Seminar of computer science	7
2	MTH10347	Informatic Theory	6
3	MTH10348	Computer Vision	7
4	MTH10349	Computational Geometry	6
5	MTH10350	Geometric design	7
6	MTH10351	Automata and Symbolic Language	
7	MTH10352	Parallel Computing	6
8	MTH10353	Introduction of Machine Learning	6
9	MTH10354	Introduction of Advanced Machine Learning	7
10	MTH10355	Mobile Computing	
11	MTH10356	Advanced Course on Artificial Intelligence	

Applied Mathematical Computer Science Specialization

Required courses:

NO.	COURSE CODE	COURSE NAME	Starting semester
1	MTH10308	Object-Oriented Software Development	5
2	MTH10309	System and Network Administration	6
3	MTH10310	Net Programming	5
4	MTH10311	Computer networking	4
5	MTH10312	Introduction to Database systems	5
6	MTH10313	Unix Operating System	5
7	MTH10314	Software Project Management	6
8	MTH10315	Information Systems Analysis And Design	6
9	MTH10316	Java Programming	5

Elective courses:

NO.	COURSE CODE	COURSE NAME	Starting semester
1	MTH10326	Seminar of Applied Informatics	7
2	MTH10327	Computer Graphic	
3	MTH10328	Curves and Algebraic Surfaces	
4	MTH10329	Symbolic programming	
5	MTH10330	Network Database	
6	MTH10331	Rendering And Image Processing	
7	MTH10332	Software Testing	6
8	MTH10333	Design and Building web applications	5
9	MTH10334	Web programming with J2EE	6
10	MTH10335	Network Design	5
11	MTH10336	Software Testing 2	7
12	MTH10337	Web Programming with PHP	6

NO.	COURSE CODE	COURSE NAME	Starting semester
1	MTH10326	Seminar of Applied Informatics	7
13	MTH10338	Topic J2EE	7
14	MTH10339	System and Network Security	7
15	MTH10340	Pattern Recognition and Analysis	
16	MTH10341	Topics in .NET	7
17	MTH10342	Wireless Lan Security	
18	MTH10343	Designing and Developing Website with PHP	
19	MTH10344	Database Management System	6
20	MTH10345	Web Programming With ASP.NET	6
21	MTH10357	Topics in Network	6

Didactics and Methodology of Mathematics Teaching Specialization

Required courses:

NO.	COURSE CODE	COURSE NAME	Starting semester
1	MTH10101	Pedagogic Psychology	4
2	MTH10102	Best practices in teaching	4
3	MTH10104	Education Study	4,5
4	MTH10105	Didactics of teaching	4,5
5	MTH10106	Elementary Number Theory And Mathematical Logic	4,6
6	MTH10112	Pedagogical Mathematics Practice	8

Elective courses:

NO.	COURSE CODE	COURSE NAME	Starting semester
1	MTH10103	Quality and Quality Management	4,6
2	MTH10119	Mathematics in English 1	4,6
3	MTH10120	Mathematics in English 2	5,7
4	MTH10121	Elementary Algebra	4,6
5	MTH10122	Elementary Geometry	5,7
6	MTH10123	Application of advanced mathematical methods in solving complex high school's mathematics problem	5,7
7	MTH10124	Classroom Management And Organization	5
8	MTH10125	Classroom assessment techniques	5
9	MTH10126	Pedagogy Seminar	6

Mathematical Finance Specialization

Required courses:

NO.	COURSE CODE	COURSE NAME	Starting semester
1	MTH10201	Elementary Financial Mathematics	5
2	MTH10202	Forecasting	5
3	MTH10203	Mathematical finance models	5
4	MTH10204	Financial and monetary theory	5
5	MTH10209	Advanced Financial Mathematics	5

Elective courses:

NO.	COURSE CODE	COURSE NAME	Starting semester
1	MTH10214	Quantitative Microeconomics	5
2	MTH10215	Quantitative Macroeconomics	6
3	MTH10216	Risk Management	6
4	MTH10217	Corporate finance	5
5	MTH10218	Seminar on Mathematical finance	5
6	MTH10219	Financial analysis	5
7	MTH10220	Actuarial Mathematics	5
8	MTH10221	Advance Actuarial Mathematics	6

General elective courses

NO.	COURSE CODE	COURSE NAME	Starting semester
1	MTH10549	Internship	6,7,8
2	MTH10617	Surveys of Mathematics, Computer Science, and specializations	4

Graduating works

NO.	COURSE CODE	COURSE NAME	Starting semester
1	MTH10595	Thesis	7,8

According to self-assessment report the following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved by the Bachelor degree programme *Physics*:

Objective 1	Science knowledge: Having a natural science, economics, society, and ideological politics; learners can grasp the characteristics of nature, economy, and society in practical contexts of science and life
Objective 2	Knowledge in physics foundation and profession: Being able to analyze and solve problems related to their major, and research and apply in production practice, design, manufacture, process formulate, survey, evaluation, and solutions of specialized problems
Objective 3	Professional skills: Being able to participate in moral qualities, personal and social skills, including independence, creativity, adapting to new environments, communication, and cooperation to work effectively and successfully in a modern working environment, serving the community
Objective 4	International communication: Having skills in communication, teamwork, teamwork, and foreign language (English) to gain leadership positions in professional careers

The following indented learning outcomes (ILO) are presented:

Label	**Learning outcomes**
ILO 1	Apply basic knowledge of natural science (math, chemistry, earth science, and informatics) and social science to support solving problems in physics.
ILO 2	Apply fundamental and in-depth knowledge of physics and mathematical formulation for theoretical analysis, modeling, and simulation of relevant processes.
ILO 3	Apply knowledge of one of the following majors: theoretical physics, nuclear physics, applied physics, solid-state physics, geophysics, physics and electronic engineering, physics, and computer science in order to solve problems in the field of physics and engineering physics.
ILO 4	Apply career skills for problem-solving in physics and engineering physics, including skills such as logical thinking, scientific research, practice, design, and conducting experiments.
ILO 5	Apply personal skills such as communication skills, lifelong self-study skills, critical thinking skills, judgment, and decision-making skills.

ILO 6	Using specialized English terminology and information technology for scientific research and personal development.
ILO 7	Apply physics knowledge and experience to conceptualize, analyze and design new physical situations.
ILO 8	Understand organization, leadership, planning, teamwork, and effective communication in science and social interaction.
ILO 9	Analyze and evaluate experimental results, processes, methods, and research results in a specific discipline or interdisciplinary.
ILO 10	Understand the professional culture, professional ethics, professional responsibility, respect themselves, and colleagues, be honest, and community service.

The following **curriculum** is presented:

COURSE CONTENT - TEACHING PLAN

Course content for year 1

Code	Title	Credit	ECTS	Mandatory/Optional	Plan
BAA00101	Philosophy Marx-Lenin	3	4.5	Mandatory	Semester 1
BAA00102	Marxist-Leninist Political Economic	2	3.0	Mandatory	Semester 1
MTH00003	Integral calculus 1B	3	4.5	Mandatory	Semester 1
MTH00081	Practice for integral calculus 1B	1	2.0	Mandatory	Semester 1
PHY00001	General physics 1 (Mechanics and Thermodynamic)	3	4.5	Mandatory	Semester 1
PHY00010	Introduction to Physics	3	5.5	Mandatory	Semester 1
BAA00011	English 1	3	5.0	Mandatory	Semester 1
BAA00021	Physical education 1	2	3.5	Mandatory	Semester 1
BAA00004	Introduction to Vietnamese Law System	3	4.5	Mandatory	Semester 1
CHE00001	General chemistry 1	3	5.0	Mandatory	Semester 2
MTH00004	Integral calculus 2B	3	4.5	Mandatory	Semester 2
MTH00030	Linear algebra	3	4.5	Mandatory	Semester 2

Code	Title	Credit	ECTS	Mandatory/Optional	Plan
PHY00002	General physics 2 (Electromagnetism – Optics)	3	4.5	Mandatory	Semester 2
PHY00003	General physics 3 (Mechanics – Thermodynamics)	3	4.5	Mandatory	Semester 2
PHY00081	Lab Work on General Physics	2	4.0	Mandatory	Semester 2
BAA00012	English 2	3	5.0	Mandatory	Semester 2
BAA00022	Physical education 2	2	3.5	Mandatory	Semester 2
CSC00003	Computer science 1	3	5.5	Mandatory	Semester 2

Course content for year 2

Code	Title	Credit	ECTS	Mandatory/Optional	Plan
BAA00104	History of Vietnamese communist party	2	3.0	Mandatory	Semester 3
BAA00003	HoChiMinh's Ideology	2	3.0	Mandatory	Semester 3
BAA00103	Scientific Socialism	2	3.0	Mandatory	Semester 3
MTH00040	Probability statistics	3	4.5	Mandatory	Semester 3
PHY00004	Modern physics (Quantum – Atom – Nucleus)	3	4.5	Mandatory	Semester 3
BAA00005	General economic	2	3.0	Optional 1	Choose either 1/ semester 3
BAA00007	General psychology	2	3.0	Optional 1	
BAA00006	Innovative methodology	2	3.0	Optional 1	
GEO00002	Earth science	2	3.0	Optional 2	Choose either 1/ semester 3
ENV00001	General environment	2	3.0	Optional 2	
PHY10001	Functions of a Complex Variable	2	3.0	Mandatory	Semester 3
PHY10002	Lab of Fundamental Physics	2	4.0	Mandatory	Semester 3
BAA00013	English 3	3	5.0	Mandatory	Semester 3

Code	Title	Credit	ECTS	Mandatory/Optional	Plan
PHY10003	Computational Mathematics	3	5.0	Mandatory	Semester 4
PHY10004	Mathematical Methods for Physics	3	4.5	Mandatory	Semester 4
PHY10005	Basic Electronics	3	5.0	Mandatory	Semester 4
PHY10006	Theoretical Mechanics	3	4.5	Mandatory	Semester 4
PHY10007	Quantum Mechanics 1	3	4.5	Mandatory	Semester 4
PHY10008	General Nuclear Physics	3	5.0	Mandatory	Semester 4
PHY10009	Electrodynamics	3	4.5	Mandatory	Semester 4
BAA00014	English 4	3	5.0	Mandatory	Semester 4
PHY10010	Solid State Physics	3	4.5	Mandatory	Semester 5
PHY10011	Statistical Physics	3	4.5	Mandatory	Semester 5
PHY10012	Atomic Physics	2	3.0	Mandatory	Semester 5

After year 2, student has to choose 1 from 7 specializations

1. **Specialization of Electronic Physics**

Course content for year 3

Code	Title	Credit	ECTS	Mandatory/Optional	Plan
PHY10101	Embedded Programming Techniques	2	3.0	Mandatory	Semester 5
PHY10102	Electronics Engineering	2	3.0	Mandatory	Semester 5
PHY10103	Computer architecture	2	3.0	Optional	Choose either 1/ semester 5
PHY10104	Embedded System Design	2	3.0	Optional	
PHY10105	Integrated Microelectronic Devices	2	3.0	Mandatory	Semester 5
PHY10106	Electronic Instrumentation and Sensing	2	3.0	Mandatory	Semester 5
PHY10107	Practice in Embedded Programming Techniques	1	2.0	Mandatory	Semester 5
PHY10108	Practice in Electronic Instrumentation and Sensing	1	2.0	Mandatory	Semester 5

Code	Title	Credit	ECTS	Mandatory/Optional	Plan
PHY10109	Signals, Systems and Circuit Analysis	2	3.0	Mandatory	Semester 6
PHY10110	Power Electronics	2	3.0	Mandatory	Semester 6
PHY10111	Bio-Medical Electronics	2	3.0	Mandatory	Semester 6
PHY10112	Microcontroller and Application	2	3.0	Mandatory	Semester 6
PHY10113	Practice in Microcontroller and Application	1	2.0	Mandatory	Semester 6
PHY10114	Communication and Signal Processing	3	5.0	Optional	Choose either 1/ semester 6
PHY10115	Computer Vision	3	5.0	Optional	
PHY10116	Programmable Logic Controller and Production lines	2	3.0	Mandatory	Semester 6

Course content for year 4

Code	Title	Credit	ECTS	Mandatory/Optional	Plan
PHY10117	Practice in Programmable Logic Controller and Production lines	1	2.0	Mandatory	Semester 7
PHY10118	Electrical Engineering	3	5.0	Mandatory	Semester 7
PHY10119	Digital and Analog IC design	2	3.0	Mandatory	Semester 7
PHY10120	Practice in Digital and Analog IC design	1	2.0	Mandatory	Semester 7
PHY10121	Industrial Robot	2	3.0	Optional	Choose either 1/ semester 7
PHY10122	Electronic Robot	2	3.0	Optional	
PHY10123	Factory tours and reports	2	3.5	Mandatory	Semester 7
PHY10995	Graduation Thesis	10	20.0	Mandatory	Choose either graduate thesis or 3 graduate courses/ semester 8
PHY10180	Smart House	2	3.0	Mandatory	
PHY10181	PLC Networks Programming	2	3.0		
PHY10190	Seminar Report	6	12.0		

3. Specialization of Nuclear physics

Course content for year 3

Code	Title	Credit	ECTS	Mandatory/Optional	Plan
PHY10301	Nuclear Physics Theory	4	6.0	Mandatory	Semester 5
PHY10302	Physics of Radioactivity	2	3.0	Mandatory	Semester 5
PHY10303	Method of Radiation Detection and Measurement	3	5.0	Mandatory	Semester 5
PHY10313	Quantum Mechanics in Nuclear Physics	2	3.0	Optional	Semester 5
PHY10304	Neutron Physics and Nuclear Reactor	3	4.5	Mandatory	Semester 6
PHY10305	Nuclear Safety and Dosimetry	3	4.5	Mandatory	Semester 6
PHY10306	Statistical Analysis for Experimental Data in Nuclear Physics	3	5.0	Mandatory	Semester 6
PHY10307	Informatics Applied in Nuclear Physics	2	4.0	Mandatory	Semester 6
PHY10308	Fundamental Practice in Nuclear Physics	2	4.0	Mandatory	Semester 6
PHY10315	Accelerator	2	3.0	Optional	Semester 6
PHY10318	Nuclear Reactor Technology and Nuclear Power Plant	2	3.0	Optional	Semester 6
PHY10319	Medical Imaging and Image Analysis	3	4.5	Optional	Semester 6

Course content for year 4

Code	Title	Credit	ECTS	Mandatory/Optional	Plan
PHY10309	Advanced Practice in Nuclear Physics	2	4.0	Mandatory	Semester 7
PHY10310	Nuclear Analytical Methods	2	3.0	Mandatory	Semester 7
PHY10311	Applied Nuclear Physics in Agricultural-Medical-Biology	2	3.0	Mandatory	Semester 7

Code	Title	Credit	ECTS	Mandatory/Optional	Plan
PHY10312	Applied Nuclear Physics in Industry	2	3.0	Mandatory	Semester 7
PHY10314	Tour for Nuclear Physics	2	4.0	Optional	Semester 7
PHY10316	Particle Physics	2	3.0	Optional	Semester 7
PHY10317	Nuclear Technique Applied in Environment and Hydrography	3	4.5	Optional	Semester 7
PHY10995	Graduation Thesis	10	20.0	Mandatory	Choose either graduate thesis or 3 graduate courses/ semester 8
PHY10980	Computation Methods in Physics	3	4.5	Mandatory	
PHY10981	Problems Simulation in Physics	3	5.0		
PHY10990	Seminar Report	4	8.0		

4. Specialization of Geophysics

Course content for year 3

Code	Title	Credit	ECTS	Mandatory/Optional	Plan
PHY10401	General Geology	2	3.0	Mandatory	Semester 5
PHY10402	Oceanography	2	3.0	Mandatory	Semester 5
PHY10403	General Geophysics	2	3.0	Mandatory	Semester 5
PHY10404	Theory of Potential and Field	2	3.0	Mandatory	Semester 5
PHY10405	Matlab Program for Geophysics	3	5.0	Mandatory	Semester 5
PHY10406	Astronomy	2	3.0	Mandatory	Semester 6
PHY10407	Atmospheric Physics	2	3.0	Mandatory	Semester 6
PHY10408	Seismology	3	4.5	Mandatory	Semester 6
PHY10415	Geophysical Signal Processing	2	3.5	Optional	Choose either 1/ semester 6
PHY10418	Environmental Geophysics	2	3.0	Optional	
PHY10416	Electromagnetic Method 1	3	5.0	Optional	Choose either 1/ semester 6
PHY10419	Electrical Prospecting	3	5.0	Optional	

Course content for year 4

Code	Title	Credit	ECTS	Mandatory/Optional	Plan
PHY10409	Magnetic Method	2	3.0	Mandatory	Semester 7
PHY10410	Gravitational Method	2	3.0	Mandatory	Semester 7
PHY10411	Geophysical Field Training	2	3.0	Mandatory	Semester 7
PHY10412	Seismic Prospecting	2	3.0	Mandatory	Semester 7
PHY10413	Geophysical Well Logging	2	3.0	Mandatory	Semester 7
PHY10414	Geographic Information System	2	3.0	Mandatory	Semester 7
PHY10417	Electromagnetic Method 2	2	3.0	Optional	Choose either 1/ semester 7
PHY10420	Ground Penetrating Radar Method	2	3.0	Optional	
PHY10995	Graduation Thesis	10	20.0	Mandatory	Choose either graduate thesis or 3 graduate courses/ semester 8
PHY10980	Computation Methods in Physics	3	4.5	Mandatory	
PHY10981	Problems Simulation in Physics	3	5.0		
PHY10990	Seminar Report	4	8.0		

5. Specialization of Theoretical Physics

Course content for year 3

Code	Title	Credit	ECTS	Mandatory/Optional	Plan
PHY10501	Quantum Mechanics 2	3	4.5	Mandatory	Semester 5
PHY10502	Theory of Solid State	3	4.5	Mandatory	Semester 5
PHY10504	Electromagnetic Field Theory	2	3.0	Mandatory	Semester 5
PHY10503	Group Theory	2	3.0	Optional	Choose either 1/ semester 5
PHY10514	Symmetries in Physics	2	3.0	Optional	
PHY10505	Theory of many-particle Systems	3	4.5	Mandatory	Semester 6

Code	Title	Credit	ECTS	Mandatory/Optional	Plan
PHY10507	Quantum Field Theory	3	4.5	Mandatory	Semester 6
PHY10508	Biophysics	2	3.0	Mandatory	Semester 6
PHY10506	Theory of Gravitational Field	2	3.0	Optional	Choose either 1/ semester 6
PHY10515	Cosmology	2	3.0	Optional	

Course content for year 4

Code	Title	Credit	ECTS	Mandatory/Optional	Plan
PHY10509	Computational Methods in Theoretical Physics	3	5.0	Mandatory	Semester 7
PHY10511	Path Integral	2	3.0	Mandatory	Semester 7
PHY10512	Theory of Particle Physics	3	3.0	Mandatory	Semester 7
PHY10513	Generalized Functions and Green Functions	2	3.0	Mandatory	Semester 7
PHY10510	Semiconductor Optics	2	3.0	Optional	Choose either 1/ semester 7
PHY10516	Quantum Optics	2	3.0	Optional	
PHY10995	Graduation Thesis	10	20.0	Mandatory	Choose either graduate thesis or 3 graduate courses/ semester 8
PHY10980	Computation Methods in Physics	3	4.5	Mandatory	
PHY10981	Problems Simulation in Physics	3	5.0		
PHY10990	Seminar Report	4	8.0		

6. Specialization of Physics and Computer Science

Course content for year 3

Code	Title	Credit	ECTS	Mandatory/Optional	Plan
PHY10601	Computational Physics	2	3.5	Mandatory	Semester 5
PHY10602	Engineering Programming in C	3	5.0	Mandatory	Semester 5
PHY10603	Electronic and Digital Circuits	4	6.5	Mandatory	Semester 5
PHY10604	Database	2	3.5	Mandatory	Semester 5

Code	Title	Credit	ECTS	Mandatory/Optional	Plan
PHY10605	Microcontroller	3	5.0	Mandatory	Semester 6
PHY10606	Electric Circuit Analysis	2	3.0	Mandatory	Semester 6
PHY10607	Data Structures	2	3.5	Mandatory	Semester 6
PHY10608	Digital Signal Processing	2	3.5	Mandatory	Semester 6
PHY10609	Object Oriented Programming	3	5.0	Mandatory	Semester 6
PHY10610	Java Programming	3	5.0	Mandatory	Semester 6

Course content for year 4

Code	Title	Credit	ECTS	Mandatory/Optional	Plan
PHY10611	Sensors and Measurements	3	5.0	Mandatory	Semester 7
PHY10614	Internship	2	4.0	Mandatory	Semester 7
PHY10612	Computer Network	3	5.0	Optional	Choose either 1/ semester 7
PHY10613	Digital Logic Design	3	5.0	Optional	
PHY10615	Web Application Development	3	5.0	Optional	Choose either 1/ semester 7
PHY10616	Programming on Mobile Devices	3	5.0	Optional	
PHY10995	Graduation Thesis	10	20.0	Mandatory	Choose either graduate thesis or 3 graduate courses/ semester 8
PHY10680	Internet of Things Application Development	3	5.0	Mandatory	
PHY10681	Advanced Logic Design	4	7.0		
PHY10981	Problems Simulation in Physics	3	5.0		

7. Specialization of Applied Physics

Course content for year 3

Code	Title	Credit	ECTS	Mandatory/Optional	Plan
PHY10701	Atomic Spectroscopy	3	4.5	Optional	Choose either 1/ semester 5
PHY10702	Molecule Spectroscopy	3	4.5	Optional	

Code	Title	Credit	ECTS	Mandatory/Optional	Plan
PHY10703	Photonics and Laser	2	3.0	Mandatory	Semester 5
PHY10704	Fundamentals of Semiconductor Devices	2	3.5	Mandatory	Semester 5
PHY10705	Vacuum and Thin Film Physics	3	4.5	Mandatory	Semester 5
PHY10720	Experiments for Spectroscopy Analysis	2	4.0	Mandatory	Semester 5
PHY10707	Measurement techniques	3	5.0	Optional	Choose either 1/ semester 6
PHY10708	Digital Circuits	3	5.0	Optional	
PHY10709	The Thin Film Fabricated Technology	2	3.0	Mandatory	Semester 6
PHY10710	Semiconductor Optoelectronic	2	3.0	Mandatory	Semester 6
PHY10711	Material analysis Techniques	2	3.5	Mandatory	Semester 6
PHY10712	Electronic and Plasma Physics	3	4.5	Mandatory	Semester 6
PHY10713	C++ Programming Language	2	4.0	Mandatory	Semester 6
PHY10714	Experiments for Thin films Fabrication Technology	2	4.0	Mandatory	Semester 6

Course content for year 4

Code	Title	Credit	ECTS	Mandatory/Optional	Plan
PHY10715	Nonlinear Optics	2	3.0	Mandatory	Semester 7
PHY10716	Nano material and Application	2	3.5	Mandatory	Semester 7
PHY10717	Matlab - Simulation and Computational Optics and Plasma Physics	2	4.0	Mandatory	Semester 7
PHY10718	Experiments for Applications of Thin Film and Nano Material	2	4.0	Mandatory	Semester 7

Code	Title	Credit	ECTS	Mandatory/Optional	Plan
PHY10719	Experiments for Applications of Laser	2	4.0	Mandatory	Semester 7
PHY10995	Graduation Thesis	10	20.0	Mandatory	Choose either graduate thesis or 3 graduate courses/ semester 8
PHY10980	Computation Methods in Physics	3	4.5	Mandatory	
PHY10981	Problems Simulation in Physics	3	5.0		
PHY10990	Seminar Report	4	8.0		

According to self-assessment report the following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved by the Bachelor degree programme *Electronics and Telecommunications Engineering:*

Objective 1	Core competency: Graduates have ability to provide engineering solutions with a solid foundation of Mathematics, Science and Technology, module domain knowledge for the field of Electronics & Telecommunications and allied disciplines
Objective 2	Technical proficiency: Graduates are capable of synergizing theoretical and practical skills, applying the appropriate methodology, critical thinking and design techniques, and state-of-the-art technology to solve practical engineering problems in specific jobs, or higher education, scientific research, industrial research and development.
Objective 3	Cognitive skills: Graduates have capabilities of working independently as well as together in groups into a high-quality pressured environment, or working effectively in diverse and multidisciplinary tasks independently, developing and integrating into a high-quality job market
Objective 4	Attitude and awareness: Graduates have a solid understanding of professional, ethical and responsibilities. Graduates also engage in continuing educational/professional, life-long learning

The following indented learning outcomes (ILO) are presented:

Label	Learning outcomes
ILO 1	Understand and apply appropriate mathematics, physics and information technology to identify, formulate and solve electronic and telecommunication-related problems.
ILO 2	Identify ideas, analZyze, practice and operate Electronics & Telecommunications systems in accordance with the contemporary development trend of the industry.
ILO 3	Design hardware, software, devices and products in the field of Electronics & Telecommunications for the global market.
ILO 4	Apply knowledge of Electronics & Telecommunications to identify, solve realistic problems and develop products.
ILO 5	Analyse and select appropriate models, techniques, tools and methods for relating given problems in the field of Electronics & Telecommunications.
ILO 6	Do research on technical literature and other extra sources of information, propose and select solutions, processes and tools to solve complex problems.
ILO 7	Applying new advances or findings in science and technology in solutions while taking into consideration the economic, ecological, technical and social requirements.
ILO 8	Present problems and solutions fluently for others by oral communication and writing technical reports.
ILO 9	Use English efficiently, comply with the standard of level 3/6 of foreign language proficiency framework.
ILO 10	Conduct independent working, lifelong learning, critical and creative thinking, behave professionally and adapt to social development.
ILO 11	Engage in teamwork, leadership and management effectively; demonstrate an awareness of project management, business practices, risk and change management or even their limitations.
ILO 12	Demonstrate an awareness of the social needs, the health, safety, legal issues; commit to professional ethics, responsibilities and norms of engineering practice and its impact in a societal and environmental context

The following **curriculum** is presented:

Expected teaching plan:

#	CODE	Name of courses	No of credits	No of periods		
				Theory	Labs	Problem solving
1	BAA00101	Philosophy Marx-Lenin	3	45	0	0
2	BAA00102	Marxist-Leninist Political Economic	2	30	0	0
3	ETC00001	Basic Electronics	3	45	0	0
4	ETC00003	Introduction to Engineering	3	30	30	0
5	MTH00003	Integral calculus 1B	3	45	0	0
6	ETC00005	Programming Technique of Electronics – Telecommunications Branch	4	30	60	0
	Total of Semester 1		**14-18**			
1	CSC00005	Web Application Programming with VB.net	3	15	60	0
2	ETC00002	Digital Electronics	2	30	0	0
3	ETC00081	Basic Electronics Lab	1	0	30	0
4	MTH00004	Integral calculus 2B	3	45	0	0
5	MTH00030	Linear algebra	3	45	0	0

#	CODE	Name of courses	No of credits	No of periods		
				Theory	Labs	Problem solving
6	PHY00002	General physics 2 (Electromagnetism – Optics)	3	45	0	0
7	PHY00010	Modern physics (Quantum – Atom – Nucleus)	3	45	0	0
8	GEO00002	Earth science	2	30	0	0
9	ENV00001	General environment	2	30	0	0
	Total of Semester 2		**14-20**			
1	PHY00001	General physics 1 (Mechanics and Thermodynamic)	3	45	0	0
2	BAA00103	Scientific Socialism	2	30	0	0
3	BAA00104	History of Vietnamese communist party	2	30	0	0
4	BAA00003	HoChiMinh's Ideology	2	30	0	0
5	ETC00004	Analog Electronics	3	45	0	0
6	ETC00082	Analog and Digital Electronics Lab	1	0	30	0
7	BAA00004	Introduction to Vietnamese Law System	3	45	0	0
8	MTH00040	Probability statistics	3	45	0	0

#	CODE	Name of courses	No of credits	No of periods		
				Theory	Labs	Problem solving
9	BAA00005	General economic	2	30	0	0
10	BAA00006	General psychology	2	30	0	0
11	BAA00007	Innovative method-ology	2	30	0	0
	Total of Semester 3		**18-21**			
1	ETC10001	Physics of Electronic Devices	2	30	0	0
2	ETC10002	Signals, Systems and Circuit Analysis	3	45	0	0
3	ETC10003	Measurement and Instruments	2	30	0	0
4	ETC10004	Measurement Lab	1	0	30	0
5	ETC10005	Computer Structure	3	45	0	0
6	ETC10006	Computer Structure Lab	1	0	30	0
7	ETC10007	Basic Computer Net-works	2	30	0	0
8	ETC10008	Basic Computer Net-works Lab	1	0	30	0
9	ETC10009	Microcontroller	2	30	0	0
10	ETC10010	Microcontroller Lab	1	0	30	0
	Total of Semester 4		**18**			

#	CODE	Name of courses	No of credits	No of periods		
				Theory	Labs	Problem solving
1	ETC10011	Numerical Analysis and Matlab	3	45	0	0
2	ETC10012	Numerical Analysis and Matlab Lab	1	0	30	0
3	ETC10013	Digital Signal Processing	3	45	0	0
4	ETC10014	Digital Signal Processing Lab	1	0	30	0
5	ETC10015	Communication Systems	3	45	0	0
6	ETC10016	Communication Systems Lab	1	0	30	0
7	ETC10017	Programmable Logic Design	3	45	0	0
8	ETC10018	Programmable Logic Design Lab	1	0	30	0
9	ETC10019	Introduction to Electronics-Telecommunications	1	15	0	0
	Total of Semester 5		**17**			
1	ETC10101	Electronic Circuit Techniques	3	30	30	0
2	ETC10102	VLSI Circuits and Technology	3	30	30	0

#	CODE	Name of courses	No of credits	No of periods		
				Theory	Labs	Problem solving
3	ETC10103	Advanced Programming Techniques	3	30	30	0
4	ETC10104	Fundamentals of Biomedical Electronics	2	30	0	0
5	ETC10105	Fundamentals of Automatic Control	2	30	0	0
	Total of Semester 6		**13**			
1	ETC10106	Sensors and Advanced Measuring Instruments	2	30	0	0
2	ETC10107	Digital Integrated Circuit and IP-core Design	2	30	0	0
3	ETC10108	Digital Integrated Circuit and IP-core Design lab	1	0	30	0
4	ETC10109	Computer Vision	2	30	0	0
5	ETC10110	Biomedical Electronic Circuits	3	30	30	0
6	ETC10111	Internship (2-3 months)	3	45	0	0
7	ETC10112	Analog Integrated Circuit Design	2	30	0	0
8	ETC10113	Analog Integrated Circuit Design Lab	1	0	30	0
9	ETC10114	Languages for VLSI Design	3	30	30	0

#	CODE	Name of courses	No of credits	No of periods		
				Theory	Labs	Problem solving
10	ETC10115	PCB Design	3	30	30	0
	Total of Semester 7		**16**			
1	ETC10116	Biomedical Signal Processing	3	30	30	0
2	ETC10117	System-on-Chip Design and Verification	3	30	30	0
3	ETC10118	MEMS, NEMS and Nanoelectronics	2	30	0	0
4	ETC10119	Audio and Video Engineering	2	30	0	0
5	ETC10120	Architecture of Mobile Devices and Programming	3	30	30	0
6	ETC10121	Power Electronics	3	30	30	0
7	ETC10190	Seminar Report	4	0	120	0
8	ETC10195	Graduate Project	10	0	300	0
	Total of Semester 8		**15**			
1	ETC10201	Advanced computer network	2	30	0	0
2	ETC10202	Data structure and Algorithms	3	45	0	0
3	ETC10203	Data structure & Algorithms Lab	1	0	30	0
4	ETC10204	VLSI Design	3	45	0	0
5	ETC10205	VLSI Design Lab	1	0	30	0
6	ETC10206	Object-Oriented	2	30	0	0

#	CODE	Name of courses	No of credits	No of periods		
				Theory	Labs	Problem solving
		programming				
7	ETC10207	Object-Oriented programming Lab	1	0	30	0
8	ETC10216	Bus Architecture	2	30	0	0
9	ETC10217	Data Base	2	30	0	0
10	ETC10218	Introduction to Cryptography	2	30	0	0
11	ETC10307	Network Technology	2	30	0	0
	Total of Semester 6		**15**			
1	ETC10208	SoC Design	2	30	0	0
2	ETC10209	SoC Design Lab	1	0	30	0
3	ETC10210	Advanced computer Network Lab	1	0	30	0
4	ETC10211	Internship (2-3 months)	3	45	0	0
5	ETC10219	Connectivity and DAQ for IoT	2	30	0	0
6	ETC10220	Connectivity and DAQ for IoT Lab	1	0	30	0
7	ETC10221	Operating systems	2	30	0	0
8	ETC10222	Operating Systems Lab	1	0	30	0
9	ETC10223	Introduction to Image and Video Processing	2	30	0	0

#	CODE	Name of courses	No of credits	No of periods		
				Theory	Labs	Problem solving
10	ETC10224	Introduction to Image and Video Processing Lab	1	0	30	0
11	ETC10225	Java programming	2	30	0	0
12	ETC10226	Java programming Lab	1	0	30	0
13	ETC10227	Network security	2	30	0	0
14	ETC10228	Network security Lab	1	0	30	0
15	ETC10229	Advanced VLSI Design	2	30	0	0
16	ETC10230	Advanced VLSI Design Lab	1	0	30	0
	Total of Semester 7		**13**			
1	ETC10212	Application Programming On Mobile Devices	2	30	0	0
2	ETC10213	Application Programming On Mobile Devices Lab	1	0	30	0
3	ETC10214	Embedded Systems	2	30	0	0
4	ETC10215	Embedded Systems Lab	1	0	30	0
5	ETC10231	Computer Memory	3	30	30	0
6	ETC10232	Network Programming	2	30	0	0

#	CODE	Name of courses	No of credits	No of periods		
				Theory	Labs	Problem solving
7	ETC10233	Network Programming Lab	1	0	30	0
8	ETC10290	Graduate Project	4	0	120	0
9	ETC10295	Seminar Report	10	0	300	0
	Total of Semester 8		**16**			
1	ETC10301	Digital Communications	2	30	0	0
2	ETC10302	Telecommunication Network	2	30	0	0
3	ETC10303	Digital Communications and Telecommunication Network Lab	1	0	30	0
4	ETC10304	High Frequency Electronics	2	30	0	0
5	ETC10305	Antenna and Wave Propagation	3	45	0	0
6	ETC10306	Antenna and Wave Propagation Lab	1	0	30	0
7	ETC10314	Routing Protocols	3	45	0	0
8	ETC10315	LAN Switching and Wireless	2	30	0	0
9	ETC10316	Cisco Networking Lab	1	0	30	0
10	ETC10317	Fundamentals of Telecommunication Programming	2	30	0	0
11	ETC10318	Telecommunication Programming Lab	1	0	30	0

#	CODE	Name of courses	No of credits	No of periods		
				Theory	Labs	Problem solving
12	ETC10319	Mobile Operating Systems	2	30	0	0
	Total of Semester 6		**16-17**			
1	ETC10307	Network Technology	2	30	0	0
2	ETC10308	Network Technology Lab	1	0	30	0
3	ETC10309	Wireless Communications	2	30	0	0
4	ETC10310	Mobile Communications	2	30	0	0
5	ETC10311	Wireless and Mobile Communications Labs	1	0	30	0
6	ETC10312	Optical Communications	2	30	0	0
7	ETC10313	Optical Communications Lab	1	0	30	0
8	ETC10320	Internship (2-3 months)	3	45	0	0
9	ETC10321	Outside Visit, Practical Work (2 weeks)	1	0	30	0
10	ETC10322	Mobile Programming	2	30	0	0
11	ETC10323	Mobile Programming Lab	1	0	30	0
	Total of Semester 7		**14-15**			
1	ETC10227	Network security	2	30	0	0
2	ETC10228	Network security	1	0	30	0

#	CODE	Name of courses	No of credits	No of periods		
				Theory	Labs	Problem solving
		Lab				
3	ETC10324	Entrepreneurship	3	45	0	0
4	ETC10325	Network Systems	3	45	0	0
5	ETC10326	Optical Network	3	45	0	0
6	ETC10327	Satellite Communi-cations	3	45	0	0
7	ETC10328	Digital Television	3	45	0	0
8	ETC10390	Seminar Report	4	0	120	0
9	ETC10395	Graduate Project	10	0	300	0
	Total of Semester 8		**13**			