ASIIN Seal

Accreditation Report

Bachelor´s degree programmes

Material Science

Material Technology

Provided by

Viet Nam National University HCMC

University of Science

Version: 12 December 2025

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]
Cử nhân Khoa học Vật liệu	B.Sc. in Materials Science	ASIIN	AUN-QA (Asean University Network) 4/1/2021-3/1/2026	05
Cử nhân Công nghệ Vật liệu	B.Sc. in Materials Technology	ASIIN	-	05

Date of the contract: 15.11.2024

Submission of the final version of the self-assessment report: 01.03.2025

Date of the onsite visit: 28.-29.05.2025

Peer panel:

Prof. Dr. Daisy Julia Nestler, University of Technology Chemnitz

Prof. Dr. Theodor Iancu, Karlsruhe University of Applied Sciences

Ha Thi Thuy Duong, Semicon JSC, Industrial representative

Nguyen Nhan Hieu, student at Da Nang University of Science and Technology

Representative of the ASIIN headquarter: Johann Jakob Winter

Responsible decision-making committee: Accreditation Commission

Criteria used:

European Standards and Guidelines as of May 05, 2015

ASIIN General Criteria, as of March 28, 2023

Subject-specific Criteria of the Technical Committee 05 – Material Science, Physical Technologies, as of March 18, 2022

[1] ASIIN Seal for degree programmes

[2] TC: Technical Committee for the following subject areas: TC 05 – Material Science, Physical Technologies

B Accreditation Status

Result Overview

The most recent decision for the ASIIN Seal was made by the ASIIN Accreditation Commission on 12.12.2025.

Degree Programmes	ASIIN Seal	Validity	Accredited by German Engineers	Validity
Ba Material Science	Accredited with requirements	12.12.2025 - 21.01.2027	Accredited with requirements	12.12.2025 - 21.01.2027
Ba Material Technology	Accredited with requirements	12.12.2025 - 21.01.2027	Accredited with requirements	12.12.2025 - 21.01.2027

Fulfilment of the Accreditation Criteria

ASIIN General Criteria / Subject-Specific Criteria	Ba Material Science	Ba Material Technology
1 Degree programme: Concept, Content & Implementation		
1.1 Objectives and learning outcomes (intended qualification profile)	**Not fulfilled** Requirement A 1	**Not fulfilled** Requirement A 1
1.2 Title of the degree programme	Fulfilled	Fulfilled
1.3 Curriculum	Fulfilled	Fulfilled
1.4 Admission requirements	Fulfilled	Fulfilled
1.5 Workload and credits	**Not fulfilled** Requirements A 1, A 2	**Not fulfilled** Requirement A 1, A 2
1.6 Didactics and teaching methodology	Fulfilled	Fulfilled
2 Exams: System, Concept and Organisation		
2 Exams: System, Concept and Organisation	Fulfilled	Fulfilled
3 Resources		

ASIIN General Criteria / Subject-Specific Criteria	Ba Material Science	Ba Material Technology
3.1 Staff and staff development	Fulfilled	Fulfilled
3.2 Student support and student services	Fulfilled	Fulfilled
3.3 Funds and equipment	**Not fulfilled** Requirement A 3	**Not fulfilled** Requirement A 3
4 Transparency and Documentation		
4.1 Module descriptions	Fulfilled	Fulfilled
4.2 Diploma and Diploma Supplement	Fulfilled	Fulfilled
4.3 Relevant rules	Fulfilled	Fulfilled
5 Quality Management: Quality Assessment and Development		
5 Quality Management: Quality Assessment and Development	**Not fulfilled** Requirement A 4	**Not fulfilled** Requirement A 4

Requirements

For all programmes

A 1. (ASIIN 1.3/ 1.5) Transparently evaluate the workload of students and assign the credits accordingly. The workload per semester needs to be balanced.

A 2. (ASIIN 1.5) The definition of one credit in terms of working hours needs to be clarified and harmonised in all official documents.

A 3. (ASIIN 3.3) Improve the occupational and equipment safety standards of the laboratories to comply with international standards.

A 4. (ASIIN 5) Demonstrate that the changes described in the university's statement have been implemented.

Accreditation History

The programmes have not been previously accredited by ASIIN.

C 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
Ba Material Science	Cử nhân/ B.Sc.	/	6	Full time	/	4 years/ 8 semesters	131 credits (232 - 244 ECTS)	Annually, August 2002
Material Technology	Cử nhân/ B.Sc.	/	6	Full time	/	4 years/ 8 semesters	130 credits (232 - 244 ECTS)	Annually, August 2020

Contextualisation

Viet Nam National University Ho Chi Minh City (VNUHCM) is one of Vietnam's largest educational institutions. The public university was founded by the Vietnamese government in 1995 to establish a centre for undergraduate and postgraduate education and scientific research, adhering to high-quality and innovative multidisciplinary technology. VNUHCM is a comprehensive institution that comprises of eight member units among which is the University of Science. The university currently offers 22 undergraduate programmes, 34 master's degree programmes, and 30 doctoral programmes in the fields of natural sciences, life sciences, mathematics and statistics, computer and information technology, environment, technology, and engineering. Overall, the university hosts more than 15,000 undergraduate students and 1,500 graduate students now. It is recognised as one of Vietnam´s top universities, being ranked the ninth university of the country by EduRank in 2025.

Both programmes under review are offered by the Faculty of Materials Science and Technology (FMST), which pursues the ***Vision*** "to become a strong training and research centre in the field of nanostructure materials, polymers, composites and advanced materials in Viet Nam, comparable to regional and international standards." Its ***Mission*** is the "training for undergraduate, postgraduate, and scientific research in the field of science and materials technology, especially advanced materials."

General assessment

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

Positive aspects of the university and the programmes are the student support system, the close contact between the students and the dedicated staff members, as well as the internal quality assurance system. On the other hand, the findings of the experts during the on-site visit point towards significant deficiencies in the programmes' curricula which do not match the learning outcomes and the Subject-Specific Criteria of the Technical Committee 05, as not all relevant components of material science are adequately covered and core elements of the discipline, mainly in the engineering domain, are missing. This is also reflected in the highly specialised structure of the programmes with a focus on narrow groups of materials, which lacks experimental fundamentals and, thus, the comprehensive understanding of the full range of materials and their properties that is characteristic for Bachelor´s programmes in this field. In that regard, the recruitment of staff members with an engineering background is essential. Therefore, the experts deem a restructuration of the programmes necessary before they can recommend them for accreditation.

Further critical issues identified by the experts concern the workload evaluation and respective credit allocation system, the quantity and quality of available equipment in the laboratories which are crucial for the practical education of the students, as well as formalities regarding specific modules and official documents. Recommendations are also given among others regarding student mobility, staff development, the closer involvement of industry partners, technology transfer, and safety standards.

Programme profiles

In its curricular overview, HCMUS presents the following objectives as profile of the Bachelor of Material Science (BaMS) programme:

"The Materials Science and Technology Faculty (FMST) currently has 4 training majors: Polymer and composite materials, Thin film materials, Magnetic materials and Biomedical materials, with the following general training goals:

Training Bachelors of Materials Science with solid and in-depth knowledge of synthesis and properties of new materials; having the capacity to develop, deploy, and apply the latest research results of new materials into life and production; having the ability to play a leadership role to develop and actively contribute to the development of science and technology.

Training Bachelors of Materials Science with good communication skills, community service spirit, ability to work in a team, initiative, adaptability, self-regulation, self-development, ability to detect and solve problems logically, creatively and systematically. Bachelors of Materials Science have the ability to compete in the domestic working environment as well as in the global labor market."

For the Bachelor of Material Technology (BaMT) programme, the following profile is presented:

“Training Bachelors of Materials Technology with solid expertise in the field of materials, proficient practical skills, high creativity, good teamwork and communication skills, proficient use of specialized foreign languages, high professional ethics and professionalism, meeting the needs of society for the field of advanced and smart materials. Bachelors of Materials Technology have the ability to apply specialized knowledge, practical skills and methodologies to research and develop products in the field of materials.”

D Expert Report for the ASIIN Seal

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
- Curricular overviews of both programmes
- Diploma Supplements of both programmes
- Objective-module matrices
- Alignment matrix of the ILO with the SSC of Technical Committee 05
- Student handbook
- Learning Outcomes website of FMST: https://mst.hcmus.edu.vn/dao-tao-dai-hoc/chuan-dau-ra
- Discussions during the audit

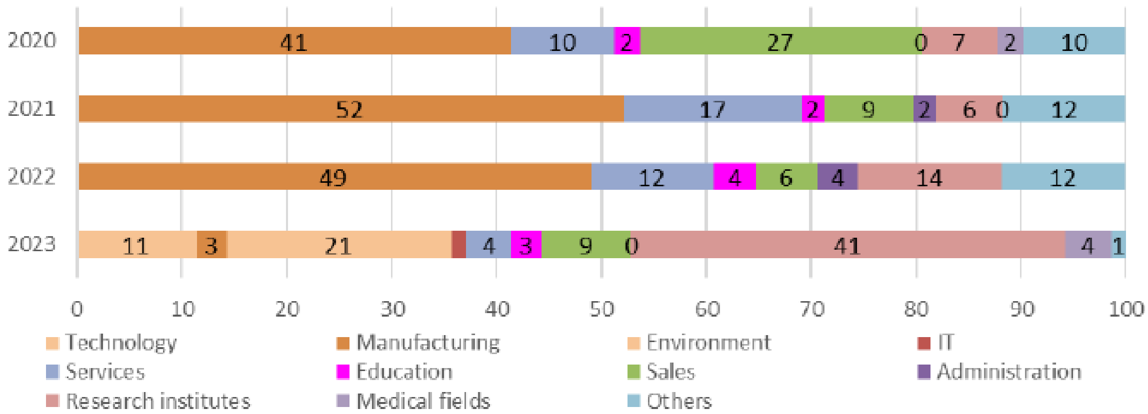
Preliminary assessment and analysis of the experts:

The experts base their assessment of the learning outcomes on the information provided in the curricular overviews, on the websites, and in the Self-Assessment Report of both degree programmes under review. The experts refer to the Subject-Specific Criteria (SSC) of the Technical Committee 05 – Material Science, Physical Technologies as a basis for judging whether the intended competence profiles of the programmes correspond with the competences as outlined by the SSC.

For both programmes, HCMUS has determined general objectives and specific Intended Learning Outcomes (ILO). They are clustered by four categories: knowledge, skills, attitudes, and professional responsibility. The individual modules are aligned with the ILO via objective-module matrices. Likewise, HCMUS presents a matrix that indicates the correlation of the programmes´ ILO with the SCC. The ILOs of all programmes are displayed in the appendix.

According to the Self-Assessment Report, both programmes aim to educate students to have knowledge in mathematics, physics, chemistry, computer science, basic social sciences, have practical skills in synthesis, characterization of materials, and the personal and professional skills to work in diverse working environments. While the BaMS programme is focused on training students with the scientific fundamentals of materials fabrications and properties and included the research and scientific skills in developing innovative materials, the BaMT programme was designed with a stronger focus on technology. The experts confirm that the ILO of both programmes are formulated in an outcome-oriented way and capture both the general as well as subject-specific knowledge, skills, and application dimensions that are outlined by the SSC of the relevant Technical Committee. Thus, they appropriately represent the Bachelor level of EQF 6.

In terms of graduate profiles, the HCMUS explains that the BaMS programme equips students to work in institutions and industries that utilize materials applications, including electronics, photonics, telecommunications, energy, agricultural, pharmaceutical, healthcare, environmental, biotechnology, plastics, and composites-related products. The results of a tracer study show that a large share of graduates works in manufacturing, while other fields of application are research institutions, educational and medical industries, as well as sales and services. The distribution of graduate employment across industries is displayed in the following figure taken from the Self-Assessment Report:



While the experts are satisfied to see that the graduate profile is sought for in the labour market, which is also confirmed by the representatives of potential employers during the on-site visit, they wonder why the share of graduates working in research institutes has been growing notably over the last cohorts. This contrasts the explicitly denominated industry focus of the programme but does not surprise the experts, as the curriculum does apparently not integrate engineering components (see section 1.3). Also, the academic staff has exclusively academic backgrounds (see section 3.1). In contrast, the curriculum of the recently introduced BaMT is much more oriented towards the industry, and the technology focus represents recent trends in the industrial field.

Because of its recent introduction in 2020, the first cohort has graduated from the BaMT programme only in 2024. Therefore, there is no aggregate database for the verification of a graduate profile for this programme yet. However, HCMUS explains in the Self-Assessment Report that designated job opportunities of BaMT graduates are positions as researchers, technicians, research and development staff, technical sales representatives or technical consultants, quality assurance specialists, and quality control staff. By means of different specialisation tracks, the programme is designed to educate specialists for jobs in the industrial companies in the production and applications of materials, which are currently in high demand on the Vietnamese labour market.

The formulation of the programmes´ intended qualification profiles has been developed based on the input of different stakeholders, including staff (lecturers, thesis advisors), employers, students, alumni, and companies. Every 3-5 years, the ILOs are evaluated and revised based on the opinions and survey results from these stakeholders. Additionally, there is a formal major curriculum revision in a 5-year circle where the curriculum is updated and reconstructed with respect to the stakeholders' feedback. Exemplary statistics displayed in the Self-Assessment Report show the results of student and employer feedback regarding different parameters of the programmes, among others, their satisfaction with the "compatibility between job and training", "specialised knowledge", and "problem-solving skills". During the audit, the relevant stakeholders of the programmes confirm their involvement in the development processes for the programmes. The introduction of the BaMT programme as a modified form of the BaMS programme shows the responsiveness of the FMST to industry trends.

In summary, the experts confirm that the objectives and learning outcomes of both programmes are described briefly and concisely. They are transparently anchored and published and thus are available to students, lecturers and interested third parties. The intended competence profile adequately represents the targeted academic qualification level EQF 6, corresponds to the applicable SSC of the Technical Committee 05, and enables graduates to find suitable jobs in related industries and research institutions. A structured review process ensures the ILOs´ topicality and relevance for the labour market and society.

Criterion 1.2 Name of the degree programme

Evidence:

- Self-Assessment Report

- Discussions during the audit

Preliminary assessment and analysis of the experts:
According to the Self-Assessment Report, a policy of the Vietnamese Ministry of Education and Training regulates the names and coding of study programmes. The titles of both programmes are aligned with the standard terminology used by professional communities both in Vietnam and internationally. Upon graduation, the students are awarded with the degree of Bachelor of Science (B.Sc.). The experts confirm that the titles are used consistently across all official documents and correspond to the primary teaching language of the programmes (Vietnamese). However, while they are in line with the intended aims and learning outcomes, the experts point out, the programme names do not adequately correspond with the curricula, as also the curricula do not match the intended competence profiles (see section 1.3). Because of the very high specialisation on certain materials, the full breadth of the field of material science, respectively material technology as a subject that is built on the foundations of material science, is not captured. The experts can also not think of any title that would adequately describe the curricula in their current forms, which would, given the deficiencies in the design of the curricula, not be reasonable. Therefore, the experts consider this criterion to be not fulfilled. The alignment of the ILO, programme titles and curricula is one of the experts´ prerequisites to consider the programmes under review for accreditation.

Criterion 1.3 Curriculum

Evidence:

- Self-Assessment Report
- Curricular overviews of both programmes
- Objective-module matrices of both programmes
- Study plans of both programmes
- Staff handbook
- Student handbook
- MoUs of partner institutions
- Module descriptions
- Website of the FMST
- Discussions during the audit

Preliminary assessment and analysis of the experts:

According to the Self-Assessment Report, the curricula of both programmes are designed according to the Vietnamese Qualification Framework and regulations of the Ministry of Education and Training. They are based on professional frameworks in the field and are benchmarked with corresponding programmes of universities like the National Tsing Hua University (NTHU-Taiwan), Boston University (BU, USA), and Sheffield University (England).

Structure and content

The curricula encompass a total load of 130 credits each (corresponding to 221.75 ECTS for BaMS and 231.5 ECTS for BaMT) and are designed for a regular duration of four years (eight semesters). Each semester has 15 weeks. The curricula are separated into blocks of general education and professional education, the latter again divided into the groups of fundamentals, specialisation, and the graduation work. The credit distribution across these blocks is displayed in the following table taken from the Self-Assessment Report:

Knowledge modules	**Program**	**Number of credits**					
		Compulsory		**Elective**		**Total**	
		Credits	ECTS	Credits	ECTS	Credits	ECTS
I. General Education (excluding Defense Education, English, Basic Computer and Physical Education)	BsMS	50	74	4	6	54	80
	BsMT	48	84.5	4	6	52	90.5
II. Professional Education							
II.1. Fundamentals	BsMS	32	57.25	0	0	32	57.25
	BsMT	40	57	2	3	42	60
II.2. Specialization	BsMS	26	44.5	8	13	34	57.5
	BsMT	26	54	0	0	26	54
III. Graduating works	BsMS	10	20	0	0	10	20
	BsMT	10	20	0	0	10	20
Total accumulated credits for graduation (I+II.1+II.2+III)		**BsMS**				**130**	**214.75**
		BsMT				**130**	**224.5**

According to the Self-Assessment Report, the arrangement of modules in each semester is determined based on the principle that the modules of the previous semester laid the groundwork of knowledge, skills, and attitudes for the modules of the following semester. All modules and learning activities are implemented and mapped in an objective-module matrices.

The general education in the first three semesters of both programmes provides students with the mathematical, chemical, physical, and biological basic knowledge, social sciences and the subject-specific introduction to materials science to prepare them for the following learning stages. Besides the basic natural science modules, the social science modules, which are compulsory for all Bachelor´s programmes in Vietnam, include, e.g. “General Law”, “National Defence - Security Education”, “Physical Education”, and “Marxist-Leninist Philosophy”. Additionally, the general education also provides two sets of three elective modules each, out of which the students need to take one. The options are displayed in the detailed curricular overviews contained in the appendix.

The fundamental education stage in the fourth and fifth semester deals with fundamental principles of materials science and technology, the relationships between structure, properties, processing, and performance of materials, material types and their properties, as well as material characterisation. Meanwhile, the following two semesters constitute the specialisation stage, in which students of both programmes have to choose a specialisation track. While the curricula of both programmes are almost identical up to that point, this stage constitutes their differentiation. The following specialisation tracks are offered:

For BaMS:

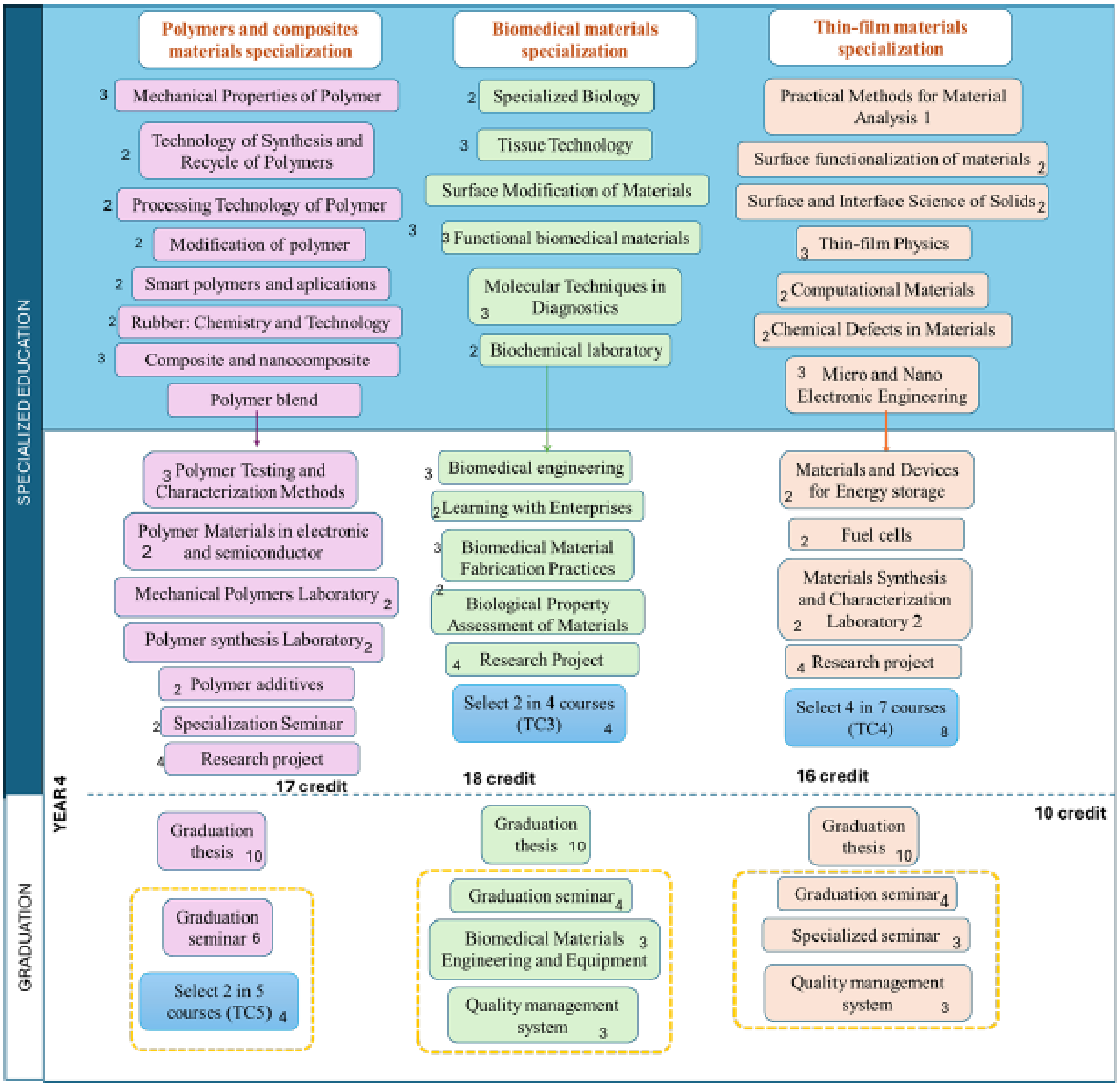
- Polymer and Composite Materials
- Thin-film Materials
- Biomedical Materials

For BaMT:

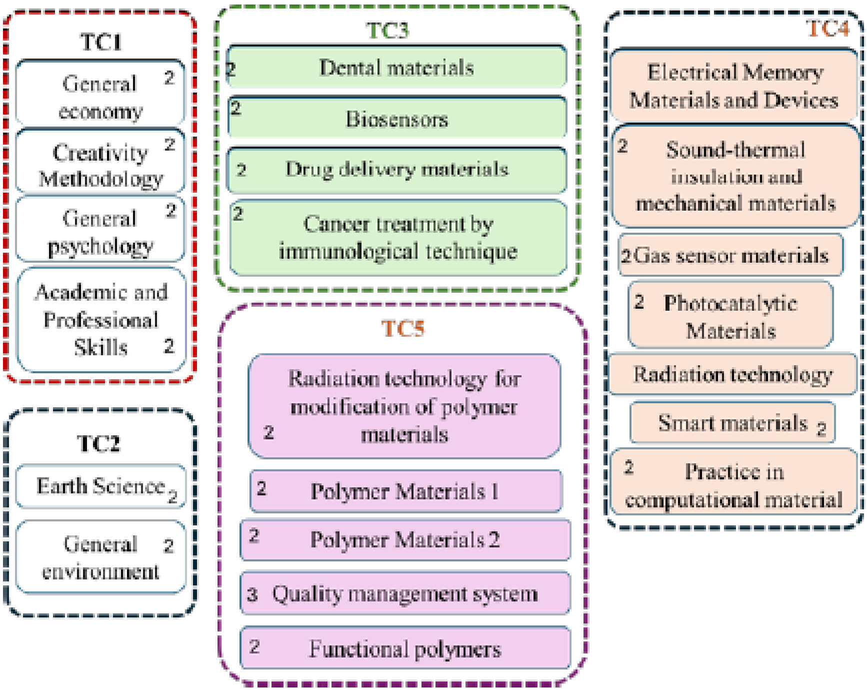
- Biomedical Material Technology
- Polymer and Composites Material Technology
- Semiconductor Material Technology
- Renewable Energy Material Technology

The specialisation tracks include both track-specific compulsory modules as well as slots for elective modules to be chosen out of a catalogue of different elective module groups. The seventh semester of the BaMT also contains an industrial internship, which lays the ground for the specialised final graduation semester. The structure of both programmes´ specialisation stages is schematically outlined in the following figures taken from the Self-Assessment Report.

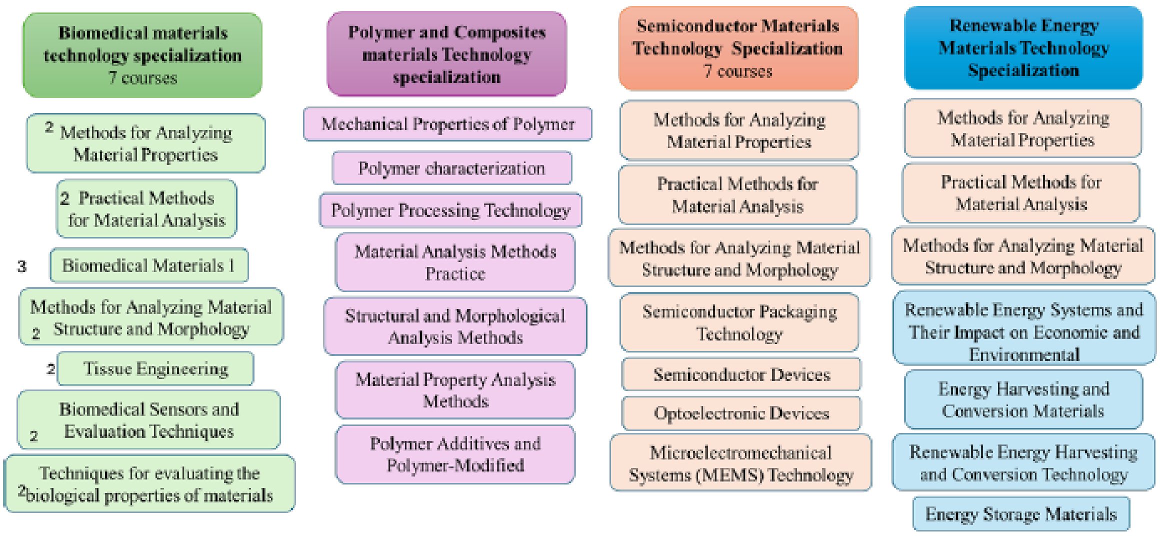
<u>BaMS core modules</u>



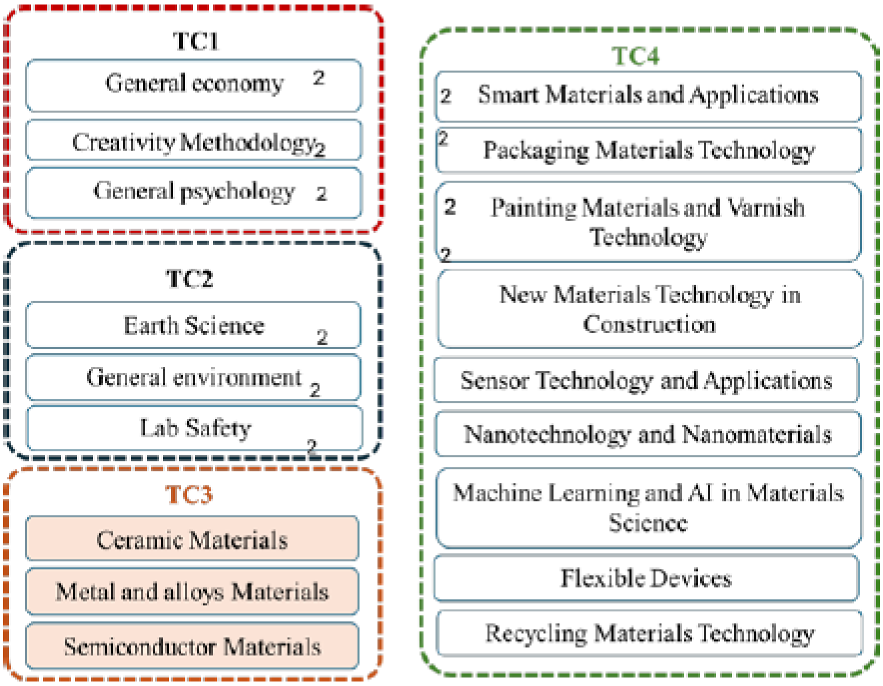
BaMS elective modules



BaMT core modules



BaMT elective modules



As a first discussion point regarding the curricular structure of both programmes, the experts inquire about the last semester, which offers the choice between a "Graduation thesis" and a "Graduation seminar". The latter option, because of its lower credit number, is complemented with additional elective modules according to the chosen specialisation. The programme coordinators explain that the term "seminar" is not quite accurate as this option refers to a graduation project, however, with a more applied focus and a lower depth than the thesis. The experts point out that a Bachelor´s thesis needs to be a mandatory component of any undergraduate study programme (see also section 2), but also discuss that a project work can still fulfil this requirement as long as it adequately demonstrates the students´ ability to independently and scientifically deal with a task at the Bachelor´s degree level. While the experts confirm that this is the case for the graduation thesis, they find that the provided examples of project works are of varying academic quality but generally do not represent this aspiration on a Bachelor´s level. The programme coordinators explain in that regard that almost all students choose the thesis anyway, and that the option of the seminar has therefore been abandoned in the last curriculum review. However, as this choice is still reflected in all curriculum documents, the experts see no proof of that and require HCMUS to include the thesis as a compulsory module in both programmes without exception. Alternatively, the level of the final project has to be raised in order to correspond to EQF level 6. Moreover, as further elaborated below, the experts point out that the topics of both thesis and project work mostly do not align with the ILO of material science and material technology (see below).

Looking at the curricular contents of both programmes, the experts deem that the basic subjects in mathematics, chemistry, physics, and informatics are adequately covered as part of the fundamental education stage. On the positive side, they also confirm that soft skills appear to be covered to a reasonable extent as part of the teaching methodology, as the students and industrial stakeholders confirm. However, since the designated module “Academic and professional skills” is only elective, the auditors suggest that the importance of this subject might be emphasised by making the module compulsory. Furthermore, the experts positively acknowledge that the general education also encompasses four “English” language modules.

However, when it comes to the essence of material science, which is the integration of these subjects with respect to different materials, they voice their concerns that the curricula do not contain the necessary modules that enable the students to attain the learning outcomes. They point out that, as outlined in the SSC, the discipline of material science deals with five kinds of materials: metals, polymers, ceramics, natural materials and compound materials. In order to understand the distinct features of the production and processing up to the application and failure of materials, it is crucial to cover the properties of all these materials. Besides the modules “General Material Science” in BaMS, respectively “Fundamentals of Material Science” in the BaMT, the experts do not find the full range of these materials covered at all in the curriculum. Instead, the curricula of both programmes show a high level of specialisation which is not adequate for Bachelor´s programmes and excludes too many subjects for the overall perspective of material science.

The experts do not generally oppose the concept of specialisations within the curricula. However, they assess the current extent (three semesters) and selection of specialisations to be very heterogeneous and designed in a way that does not enable students to really specialise in the sense of material science. In relation to the basic curriculum, the specialisations each contain the application of a limited number of material applications but do not form a coherent whole. This becomes apparent in the presented examples of final theses which, although adequately representing the Bachelor´s level, do rarely contain topics and apply methods of material science and/ or technology, but rather applied chemistry, physics, or biology. While chemistry and physics are at least related to material science, biology is a subject without direct relation to the discipline. As another piece of evidence in that regard, the experts examine different products and objects produced as part of the teaching and research projects, such as a fluid fertiliser as an exemplary product for the specialisation in biomedical materials. As the experts stress, this is a product related to biology and chemistry, respectively agriculture, but is clearly not connected to material science.

The critical concerns regarding the different specialisations are explained as follows:

- Biomedical materials: Fundamental knowledge required for appropriate material selection is missing (see above).
- Polymer and composites: Extensive knowledge of thermoplastic and thermosetting polymers is required. In addition, the production of composite materials necessarily involves reinforcement components such as fibres or particles. This means that these reinforcement components must also be taught. On top of that comes a wide range of associated manufacturing methods, including the proper selection of the right method for each specific product. Moreover, modelling and simulation are indispensable in this field. The current specialisation track is much too narrow to capture this wide field of materials and skills students need to understand and work with them.
- Thin-film materials: For this specialisation, the experts find the focus too narrow, too. During the audit, the experts were only shown thin-film coating by means of PVD. This is sensible but represents only a small part of thin-film materials and coating technologies, giving the experts the impression of a "specialisation within the specialisation".

In this regard, the experts inquire about the background of these specialisations and learn from the programme coordinators that they were chosen based on feedback from the industry. While the experts generally appreciate this stakeholder involvement, they note during the interview session with the representatives of potential employers and professional associations that, in the first place, the major share of participants stems from research institutions which again contradicts the proclaimed industrial focus of the programmes, and, secondly, that the representatives of industrial companies do not embody companies with genuine material science applications. Instead, most people work within the limited area of one of the materials, most prominently, in jobs that the experts categorise more as applied natural sciences. The experts find that this does not fulfil the claim of material science, respectively technology. In this regard, the experts recommend, as part of the required overall review of the curricula, to restructure the specialisations and focus on the two main classes of materials, which are polymers and advanced (respectively specialised) materials (containing nanotechnology, thin coating, and natural materials). This would allow for an adequate extent of specialisation without losing the focus on the overall material science perspective and the dispersion of both human, financial, and material resources due to the manifold specialisations.

Additionally, the experts identify the lack of basics in engineering as a crucial deficiency with respect to the integrative character of material science in both programmes. Looking at the CVs of the teaching staff contained in the handbook, this comes as no surprise, as there is not one staff member with an engineering background or industry experience in relevant technical companies (see also section 3.1). This engineering perspective is crucial for the understanding of material processing and production, not only in the BaMT but also in the BaMS programme and therefore needs to be mandatorily included in the programmes. The lack of engineering experience is particularly notable, looking at the share of practical hours within the modules, which the experts consider much too low. As examples, they mention the modules "Fundamentals of Solids Science", "Introduction to Materials Science", "General Physics", "Material Fabrication Methods", and "Material Characterisation Techniques" which, according to the module handbooks, do not contain any practical laboratory work and even none or very few exercise hours. Although the programme coordinators explain that the students get to know all basic testing methods, the experts deduce from the students´ feedback that their possibilities to gain hands-on experience and understanding of the material properties through these tests are limited, and that in many laboratory classes, the students can only observe a teacher doing an experiment. The experts stress that practical application needs to be included from the beginning of the studies on, and that all students have to acquire hands-on experience with basic testing methods, e.g. tensile tests, themselves. This also goes along with the insufficient laboratory facilities and equipment (see section 3.3). In general, it would be crucial to include more individual laboratory work and reports as well as team-oriented project work into the modules.

Furthermore, another shortcoming with regard to the curriculum is that the topicality in terms of recent global challenges and the relevance of materials for them is barely covered by the curricula. Topics like climate protection, resource efficiency, cost-effectiveness, and digitalisation are crucial considerations in today´s production and use of materials. The programme coordinators explain that a new specialisation in renewable energy material technology was recently implemented in the BaMT programme, and that these topics are covered within other modules in both programmes. However, the experts do not find this reflected in the module handbook and also point out that the designated teaching hours do not suffice to include these considerations in addition to the general content of the modules. In this regard, the experts refer again to the need for a more extensive coverage of the properties and applications of all the above-mentioned material groups, as only this knowledge can enable students to compare and critically reflect on these global challenges in material science. Therefore, as part of the required restructuring of the programmes, these topics need to be suitably included in the programmes.

Specifically for the <u>BaMT programme</u>, the experts also question how the specifics of material technology can be taught to students if they lack the general knowledge of material science, which is foundational to the more specialised, technology-oriented considerations. The programme coordinators explain that the hours of certain modules of the BaMT have been reduced in their mostly practical, teaching hours to include more specialised modules without exceeding the regulated limit of 130 credit points. In this regard, the experts stress that, on the contrary, practical teaching hours should be higher in the BaMT programme to strengthen the industry-oriented, applied profile of the programme.

In this regard, the experts appreciate that the BaMT programme contains an “Enterprise internship” which is conducted in the semester break between the sixth and seventh semester, although this is not documented in the module handbook (see section 4.1). It is clarified during the audit that the other “internship” modules contained in the study plan, like the “Mechanical Properties of Polymer Internship” and the “Polymer Synthesis Internship”, refer only to practical modules at the university. However, as an additional component of industrial integration, there is a module called “Learning with enterprises” which, as the programme coordinators explain, contains lessons by industrial guest lecturers as well as site visits, which is positively acknowledged. The programme coordinators further explain that the duration is at least three weeks of full-time work (worth 3 credit hours) but that students can prolong it up to 10 weeks if their time in the semester break allows it. The students explain that the university provides a list of cooperating partners per specialisation, including companies and research institutes, and students can choose their preferred internship place according to their specialisation. They as well as the representatives of the industry, who are present during the audit, confirm their overall satisfaction with the internship system. With respect to the listed partners, the experts note that it also contains a number of foreign universities. While they appreciate university cooperation in terms of research and academic mobility (see below), they point out that internships at other universities do not fulfil the purpose of practical industrial experience. Therefore, the focus in this regard should be on the collaboration with industrial companies. Also, the experts wonder whether this system of industrial integration applies only to the BaMT since the BaMS programme does not include any industrial practice components. The experts point out that, although material technology may be more industry-centred than material science, industrial practice, knowledge, and technology transfer are crucial for BaMS students as well. Therefore, they highly recommend HCMUS to include an industrial internship in the BaMS programme too.

In summary, the experts state that both programmes´ current curricula are not in accordance with the applicable SSC for material science and technology programmes, and do not constitute a basis for students to attain the ILOs. The curricular contents miss the overall scope of material science and technology programmes in different aspects, as explained above. Therefore, the experts see the need for a comprehensive redesign of the curricula and see two possible approaches:

1. Reorganisation only of the fundamental stage of both programmes concerning the provisions of the SSC, including the full range of subjects relevant to material science, and their respective integration. Consecutive specialisations should be chosen in reasonable and interrelated fields. Given the newly established laboratories, the experts would deem polymers and fibre-reinforced polymers as two reasonable directions. In this case, the specialisations should constitute an applied focus, and the programmes need to be denominated accordingly (e.g., “Applied Material Science” or “Specialised Material Science”).
2. Reorganaisation of the entire programmes with respect to the provisions of the SSC to allow students the acquisition of the relevant knowledge and skills in the full extent of material science to justify the programme name. Specialisations might be included to a lower extent as elective modules.

Crucial for both programmes is the practical teaching both at the university as well as in exchange with industrial partners via internships. While this appears to be reasonably done in the BaMT programme, the experts require to include an industrial internship also in the curriculum of the BaMS programme as outlined also by the applicable SSCs. Besides this, the Bachelor´s thesis needs to be included as a compulsory module without elective alternatives in both programmes.

Internationalisation and student mobility

In terms of student mobility, HCMUS has established the Office of External Relations which is responsible for managing the collaborations with both domestic and international partner universities, institutes, businesses, and organisations. This office also manages student and lecturer exchange programmes, supports incoming students, and administers and mitigates scholarships for outgoing students.

The Self-Assessment Report outlines that the designated window for academic mobility in undergraduate programmes is the internship. As evidenced by respective memorandums of understanding, FMST has partnerships with international institutes like JAIST Institute (Japan), Sinica Institute (Taiwan), Polytech Savoie University (France), University of Ulsan (Korea), Yonsei University (Korea), Pusan National University (Korea), as well as Ming Chi University of Science and Technology (Taiwan). The experts generally welcome that a mobility window is defined and consider an internship abroad a valuable experience for the students. However, as noted before, internships, also abroad, should focus on industrial contexts rather than university settings.

For regular coursework-bound student exchanges, the provided memorandums of understanding show that, per year, up to five outgoing FMST students can be accepted by Kookmin University in Seoul (South Korea) and three by National Tsing Hua University (Taiwan). Details about the prerequisites, designated mobility windows and necessary respectively recognised coursework are defined in the individual MoUs. General regulations for the recognition of externally achieved credits are transparently outlined in article 13 of the student handbook (see also section 1.4).

While the experts appreciate the detailed agreements about student exchanges, they find that eight places are comparatively low for the overall number of students and see room for improvement in terms of the available capacities for student mobility. They also wonder why none of the students present during the on-site interview had participated in mobility activities, although the interest appears to be given. Common problems mentioned are the high competitiveness of the application process, which is based on the overall GPA and the students´ academic profile, as well as the funding. Although students do not have to pay tuition fees at the receiving universities, the higher living costs as well as transport and housing, are critical issues for many students. In that regard, the experts recommend expanding the number of student exchange places and establishing funding options for financing the mobility periods.

For incoming mobility, the only MoU is with Université Savoie Mont Blanc (France) and, as two exchange students report during the visitation of facilities, these students mainly come to conduct a research project instead of taking modules. In this regard, the experts see huge potential too for improving international exposure to their own students by facilitating the intake of international students into the programmes. A necessary precondition for that would be the use of English as the instruction language in certain suitable modules which, given the language competency of the students and lecturers, should be manageable with some training effort.

In summary, the experts confirm that HCMUS provides an appropriate structural framework for student mobility. However, the available number of places should be increased, and both incoming and outgoing students should be supported with respect to the outlined bottlenecks of the programmes. Overall, the experts therefore recommend fostering both outgoing and incoming student mobility.

Curriculum Review

As explained before, the design of the curricula is based on national regulatory and professional standards. Like the intended competency profiles, the curricula also undergo a macro review every five years and are additionally continuously evaluated based on the feedback of external stakeholders and students (see section 1.1). Results of the review processes, like the introduction of new modules, are recorded in a respective table. The programme coordinators and industrial stakeholders furthermore explain that there are annual feedback surveys for the development of the programmes also in between this regular review interval. The experts are generally satisfied with this process. However, they get the impression that the involved stakeholders are, to a large part, research institutions, very specialised companies that aim at the specialisation tracks, as well as companies that already employ graduates of FSMT. In that regard, the experts encourage both national and international benchmarking, which also needs to be a first step for the required curricular restructuring.

Criterion 1.4 Admission requirements

Evidence:

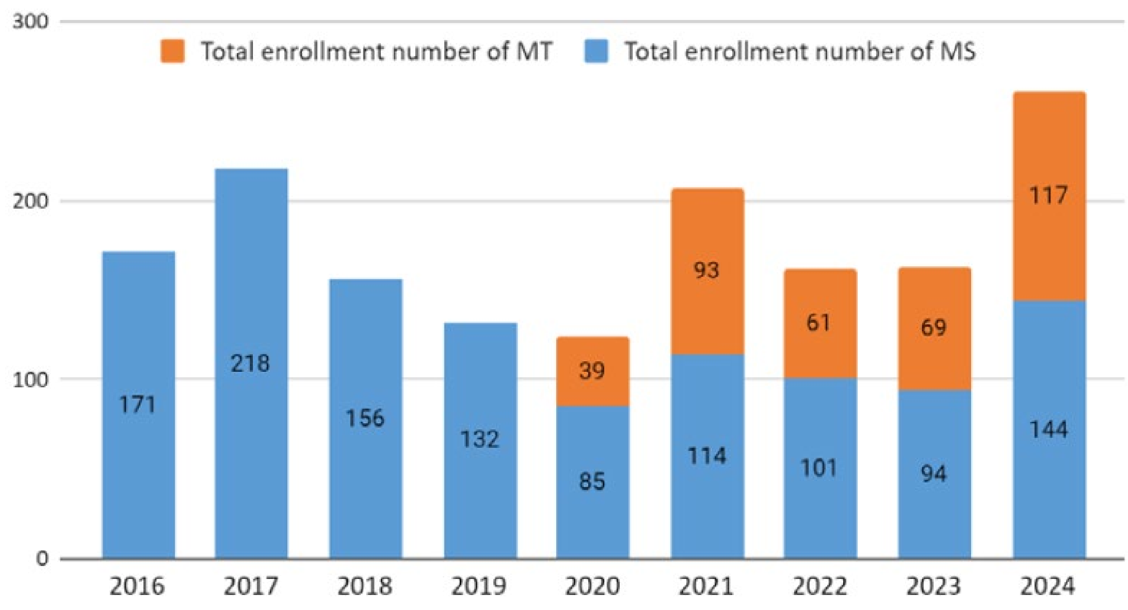
- Self-Assessment Report
- VNUHCM admission guidelines
- HCMUS admission flyer
- Statistics on enrollment by admission methods
- HCMUS admission website: https://tuyensinh.hcmus.edu.vn/
- Special provisions website: https://hcmus.edu.vn/thong-bao-thuc-hien-che-do-chinh-sach-cho-sinh-vien-hoc-ky-2-2024-2025/
- Discussions during the audit

Preliminary assessment and analysis of the peers:
As outlined in the Self-Assessment Report and the admission flyer, there are six pathways to enter undergraduate programmes at HCMUS:

1. Admission selection based on the results of the national high school graduation examination
2. Direct admission and priority-based selection for admission according to Ministerial regulations, e.g. for candidates who won the National Excellent Student Prize
3. Admission selection based on the VNUHCM National University competency assessment test
4. Priority-based direct admission and admission selection according to VNUHCM regulations
5. Priority admission selection based on an international high school diploma
6. Priority admission selection English language certificate and high-school result

As the statistics on enrolment by admission methods show, the share of students admitted according to the different pathways varies each year according to annually pre-determined quotas. The selection procedures are widely standardised by the Vietnamese Ministry of Education and Training, which also determines the quotas for the maximum intake numbers per admission pathway based on the university´s reports of capacities and facilities. According to the programme coordinators, the maximum student intake capacity of FMST is 200 students across all programmes offered by the faculty, but is supposed to be increased to 300. The distribution across the programmes in that regard does not matter. The statistics show that the most important admission pathways are the admission based on the national high school graduation exam score (1) with on average about 85% of all graduates using this pathway, and the performance in VNUHCM´s own national admission test (3), about 11% on average. While the first two pathways are regulated by the Ministry of Education and Training, VNUHCM administers the other pathways. The direct and priority-based admission selection is supervised and decided upon by the university´s admission council.

The total enrolment numbers per annual cohort are displayed in the following figure taken from the Self-Assessment Report:



HCMUS describes that the apparent decline in BaMS students between 2017 and 2020 was mainly due to a change in the high school curriculum leading to lower admission rates for the programmes, the effect of the Covid-19 pandemic in 2020, and the increasing competition due to newly established programmes in the Vietnamese higher education market. The problem of the high school curriculum change has to do with certain required subjects that are taken into account for the admission test, as the ministerial regulations also prescribe a *numerus clausus*-like lower-level threshold for admission. Thus, as the representatives of the Rector´s office explain, in some cases the programmes cannot fulfil the designated quotas. Another reason is that the industrial demands for material scientists have partly shifted to higher levels of technology awareness, which made the subject of material science less attractive and was the original reason for the introduction of the BaMT programme in 2020, resulting in internal competition between the two undergraduate programmes of FMST. To stabilise the intake numbers and attract the best possible students, the university representatives report to offer counselling sessions and orientation days at high schools, and special scholarship policies, which pleases the experts. Furthermore, there are special provisions for supporting the admission of students with disabilities and special needs, as well as students in particular life situations such as pregnancy.

As outlined in the student handbook, HCMUS recognises the achievements obtained by students at other institutions who enrol at the university on a short-term or long-term basis. The recognition and transfer of credits is based on the comparison of the individual modules´ learning outcomes, learning content, student workload, module assessment methods and the respective quality assurance conditions. The recognition of credits from other institutions is limited to 25% of the entire credit load. The experts positively acknowledge this transparently outlined policy.

Studying at HCMUS comes at the cost of tuition fees which are currently about VND 27,000,000 (approx. EUR 920) per academic year (see also section 3.3). Partial discounts or full exemptions from tuition fees, as well as special scholarship or support funds are available for student groups outlined on the special provisions website, including disabled students, ethnic minorities, students from disadvantaged regions, or students with specific personal conditions or family situations.

In summary, the experts confirm that the admission requirements and procedures of HCMUS are binding, transparent, and ensure the necessary prior qualification of the students. Rules for the recognition of qualifications achieved externally are clearly defined and facilitate the transition between higher education institutions.

Criterion 1.5 Workload and Credits

Evidence:

- Self-Assessment Report
- Study plans of both programmes

- Module handbooks of both programmes
- Academic regulations
- Decision “on credit transfer according to the Vietnamese Qualifications Framework to the European credit transfer and accumulation system (ECTS)”
- Samples of Diploma Supplements of both programmes
- Statistics on progress of study
- Student survey results of both programmes
- Discussions during the audit

Preliminary assessment and analysis of the experts:
As explained in the Self-Assessment Report, the applied Vietnamese credit system is based on contact hours between lecturers and students. There is a distinction between theoretical and practical credits. According to the academic regulations, one credit is defined as:

- Theoretical credit: 15 periods of theoretical lessons complemented by 30 hours of self-study time, or
- Practical credit: 30 periods of practical training, independent project work, exercise, or lab work complemented by 30 hours of self-study time.

One period is defined as 50 minutes of contact time, yielding a total workload of 42.5 hours per theoretical credit and 55 hours per practical credit. Accordingly, as defined in the respective university decision, the ECTS conversion is 1.5 ECTS per theoretical credit and 2 ECTS per practical credit. The module handbooks transparently outline both the contact hour workload as well as the total workload, including self-studies, and the respective ECTS credit number. The experts acknowledge that, despite the coupling of the credit hours with the contact hours, self-study time is taken into account in the overall workload balance. Although they wonder about the different definition of a credit hour for theory and practice, which they deem unusual, they still confirm that the number of credits is based on the respective total student workload, which is also correctly converted into ECTS. However, they point out that, in contrast to this described system, the Diploma Supplement states that one credit is uniformly defined as 50 working hours (see section 4.2). This needs to be clarified respectively corrected.

The total minimum compulsory credit load to graduate from the programmes is 131 credits for BaMS and 130 credits for BaMT, respectively, which translates to a range of 232 to 244 ECTS depending on the chosen specialisations and elective modules that might have different shares of theoretical and practical credits. Students have to register for at least 10 credits per semester, and the maximum permitted study duration is eight years. The experts confirm that these overall credit loads are adequate for Bachelor´s degrees. However, in that regard, the experts wonder why, according to the presented Diploma Supplements, all students complete significantly more credits than required. The programme coordinators explain that, due to a change in the ministerial regulations for the curriculum design, the maximum admissible compulsory credit number was reduced. Therefore, certain modules of the compulsory general education have been taken out of the credit load and GPA calculation but still appear as completed credits on the Diploma Supplement. This concerns mainly the first year of study. According to the study plans as an example of the first semester of the BaMS programme, three out of the compulsory nine modules, namely “English 1”, “Physical Education 1”, and “National defence – Security education”, are not taken into account for the overall credit calculation. The experts wonder about this but accept it considering the interpretation of accreditation criteria by ASIIN´s Accreditation Commission which states that it is acceptable to omit modules from the credit calculation if national regulations require this, as long as they do not belong to the core subject-specific curriculum. However, they point out that these modules, although not officially credited, still carry a significant workload for the students which impacts their ability to complete the designated coursework in time (see below).

According to the study plans, the credit load per semester is between 10 and 23 credits per semester for the designated study period of 8 semesters. The experts point out that this is a very significant variation of the workload per semester which makes them doubt the validity of the allocated credit numbers. The variance is even larger when the omitted modules´ credits are taken into account: The three modules mentioned in the above example have a total allocated workload of 9 credit hours, resulting in the real workload of the first BaMS semester being 26 credits (42.5 ECTS) instead of 17 credits, a workload which the experts deem highly unrealistic to manage. This is confirmed by the students who explain that the workload becomes notably lower after completion of the general education. It also comes as no surprise that the students state that they find the first study year very overwhelming because of the high workload and the number of modules to be taken, which prevents them from spending the allocated study hours on the subjects. Therefore, many students have to repeat exams or entire modules of the first year, which yields in delays of the graduation times. According to study monitoring statistics, only about 50% of all students manage to graduate within the designated graduation time, although some students also state to purposefully stretch their workload to have more time for part-time work or memberships in university clubs. Moreover, the statistics on the progress of studies show dropout rates per cohort of up to 20%. In this regard, the experts also inquire about the workload evaluation. According to the student survey results of both programmes, HCMUS conducts surveys to evaluate different aspects of the programmes, including the reasonable distribution ratio of theoretical and practical modules and the reasonable proportion of credits of general and specialised modules on an annual basis. However, a question that captures the satisfaction with the actual workload in relation to the designated workload per module has been introduced to this survey only in 2024 and during the on-site interview, the students state that there is no real evaluation which complements the picture of an implementation of the workload and credit system.

Therefore, the experts see the urgent need to improve this situation and require HCMUS to transparently evaluate the workload of students and assign the credit hours accordingly. The real student workload per semester needs to be balanced to avoid structural workload peaks and enable students to graduate from the programmes within the designated study period.

In summary, the experts confirm that a credit system based on the student workload is implemented, which accounts for both contact hours and self-study times. In addition, there is a transparent policy for the conversion of the Vietnamese credits into ECTS credits. However, the implementation of the credit system is defective as multiple modules are left out of the total credit calculation, and the designated workload per semester is very unbalanced which makes the experts doubt that the workload allocation is realistic and well-founded. This is not surprising given that the workload of the students is not properly monitored and evaluated. Consequently, students have problems coping with the workload and completing the programmes within the designated timeframe. The experts therefore require HCMUS to address these deficiencies.

Criterion 1.6 Didactic and Teaching Methodology

Evidence:

- Self-Assessment Report
- Module handbooks of both programmes
- Student survey results of both programmes
- Discussion during the audit

Preliminary assessment and analysis of the experts:

According to the Self-Assessment Report, HCMUS´s didactical concept follows its educational philosophy “Knowledge creation – Comprehensive education – Community service – Lifelong learning – Learner-centredness”. In this regard, the teaching methods are chosen in relation to their value for the attainment of the ILO and the respective derived learning outcomes of the individual modules. The Self-Assessment Report contains an overview table which links all ILO with the respective aligned teaching and assessment methods. Moreover, the teaching methods are adapted according to the class formats of each module which are lectures, seminars, laboratory work, and independent student work. The teaching formats are outlined in the module handbooks. As outlined in section 1.5, all in-class learning activities are additionally allocated at least an equal number of hours for independent work for exercises, preparatory activities, reading, and research work.

The classroom teaching activities focus on student-centred learning to pursue their active engagement and support them in developing a habit of self-study and practice. Respective teaching methods include blended learning, case studies, group work, debates, presentations, class assignments, multiple-choice tests, and in-class project work. These learning activities are designed to foster teamwork, problem-solving, critical thinking, and planning skills. Applying the concept of flipped classroom, many lectures are supplemented with corresponding audio and video materials, which were fostered during the times of the Covid-19 pandemic and have been further developed until now. The research of the teaching staff is actively integrated into the teaching methodology and students are encouraged to participate in these research activities by joining the professors´ research teams, the joint “research & exchange” student programme, attending scientific seminars and conferences or practising the preparation of scientific reports.

The experts are generally satisfied with the teaching methods in theoretical classes, as well as the incorporation of research methods in the teaching. During the on-site visit, they discuss various aspects of the teaching methodology with the teaching staff and also deduce that elements of digital teaching, e.g. via Google classroom, are reasonably integrated into the teaching methodology. This, however, could be improved by implementing a comprehensive Learning Management System including e-learning applications which, according to the programme coordinators, is still missing at HCMUS. Still, the focus is on face-to-face learning and students are even monitored, respectively guided, in their independent study parts by so-called “homework teachers”. Furthermore, there are multiple academic student clubs which provide opportunities for students to support each other in their independent study activities (see also section 3.2).

Besides this, the experts also acknowledge that, as outlined in the module handbooks, some modules include both the theoretical lectures as well as practical classes which support the transfer of knowledge into practice. However, although the students assess the share of practical classes to be adequate, the experts still find that their proportion is generally low, especially given the very limited lab capacities and equipment (see section 3.3) that constrain the students´ opportunities to get hands-on experience. The programme coordinators explain that first demonstration practice lab sessions are integrated into modules in the second year of studies, while hands-on lab practice is done from the third year on. The experts consider this to be very late as hands-on tests and experiments are essential for students to understand the different properties of different materials. However, they understand that this different approach for the incorporation of practical teaching is connected to the curricular structure described in section 1.3, which is required to be reworked overall. Concerning the teaching methodology in that regard, the experts strongly recommend implementing practical teaching already at earlier stages of the programmes.

Specifically for the BaMS programme, the experts also recommend strengthening the application-oriented teaching by including guest lecturers from the industry in sensible modules. For the BaMT programme they consider this to be adequately done via the module "Learning with Enterprises". The experts nevertheless positively acknowledge that, in response to the student surveys regarding teaching methods, the industry-oriented teaching parts have already been increased over the past years by the introduction of field trips for students to get earlier insights into practice, the increase of lab hours in basic modules, and the introduction of the internship in the BaMT programme.

The teaching methodology is regularly evaluated by means of the stakeholder surveys, most importantly by the students. Recent changes in the teaching methodology based on stakeholder feedback are outlined in the Self-Assessment Report. Based on the feedback of the students during the on-site audit and the documented results of the student surveys, the experts confirm that the teaching methods are regularly reviewed in an adequate way.

In summary, the experts confirm that a variety of teaching methods and didactic means are used to promote achieving the learning outcomes and support student-centred learning and teaching. Digital teaching is integrated into the compound of teaching methodology to a reasonable extent which supports students in their learning process, although the teaching digital mechanisms are recommended to be improved by the implementation of a comprehensive Learning Management System. Both programmes contain an adequate balance of contact hours and self-study time. Through different modules regarding research methodology, the students receive a thorough introduction to independent scientific work. A point of critique is the extent of practical teaching which should be increased, especially in terms of basic tests and experiments in the first basic modules of the programmes. The experts further confirm that it is regularly reviewed that the utilised learning and teaching methods overall support the achievement of the programme objectives.

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

Criterion 1.3:

Regarding the overall programme structure and curricula, the experts appreciate the extensive revision which the university has already conducted:

- For the BaMS programme, a new module “Materials Chemistry” was created, and existing modules have been updated to cover important topics including fundamentals of materials science, simulation/modelling, introduction to biomaterials, sustainability, ceramics, metals, and polymers. In this regard, also recent global challenges and the relevance of materials for them have been satisfactorily included in the curriculum. Moreover, a compulsory industrial internship has been integrated, which the experts consider crucial. However, with only 5.25 allocated credits, the internship is considerably short. The experts would deem a longer internship period very useful for students to gain relevant practical insights and therefore recommend increasing the allocated time and credits for the internship. Also, the experts acknowledge the university´s commitment to strengthen the material science focus of the final theses by reinforcing central research question must be a materials science and technology problem, explicitly focused on the structure-property-processing-performance relationship.

- For the BaMT programme, the basics of material science (see above) have been integrated as well. In addition, new modules “Fundamentals of Manufacturing Materials”, “Processes & Systems”. In the biomedical material technology specialisation, the module “Applied biomedical materials technology” was added which the experts consider suitable as it realises the technical input in a much better was.

Overall, the experts still consider the programmes to be highly specialised but see the core elements of material science reflected as the students now gain foundational knowledge in key material groups (polymers, composites, metals, ceramics, semiconductors) and modern methods before specialising. They are satisfied with the curricular adaptations of both programmes and confirm that they adequately reflect both the general as well as the Subject-Specific Criteria. The programme names, their intended learning outcomes and contents now correspond with each other.

As far as the specialisation areas themselves are concerned, the experts continue to believe that they are very separate from one another, which, among other things, limits the possibility of mutual research benefits and economies of scope. However, as now the basic foundations of material science are adequately represented and all specialisations build on that, they see no general problem in that. Therefore, they see their initial recommendation as fulfilled. Specifically regarding the specialisation in biomedical materials, the experts clarify that their critique did not concern the overall relevance biomedical subjects for material science. However, the modules, exams, and final thesis did not show the connection of this area to material science and/ or technology but represented basic, independent contents of the respective subject. Judging from the module descriptions as well as examples of projects mentioned in the university statement, this interlinkage of the disciplines has been improved.

Concerning the experts´ initial requirement to make the Bachelor´s thesis compulsory for all students or raise the level of the graduation project, HCMUS presents updated versions of the curricula of both programmes in which the Bachelor´s thesis is anchored as a compulsory module with 20 credits. The experts acknowledge this improvement and consider their initial requirement to be fulfilled.

HCMUS also describes further plans to foster international student mobility, which the experts consider sensible and purposeful. Nevertheless, they formalise their initial recommendation in that regard to stress the importance of this development.

Criterion 1.5:

Regarding the credit allocation, HCMUS argues that the academic regulations clearly define provisions for the credit allocation, including measures to ensure the feasibility of the workload. The credit load per semester is, in principle, limited to a maximum of 25 credits per semester. However, looking at the study plans, the designated credit load exceeds this threshold in more the half of the semesters in both programmes. Also, multiple modules like English are not counted in the credits. While this is attributed to national regulations and accepted as a formality, the workload of these modules must nevertheless be considered in the design of the study plan to ensure that students are generally able to complete the programmes within the designated study period. This is still not the case, as the study times are notably exceeded. In that regard, the evaluation of the workload should not only focus on the students´ satisfaction with the workload, but the purpose of a workload evaluation has to be on determining whether the designated workload of each module as outlined in the curriculum corresponds with the working hours that the students, on average, have to invest in the respective module. The experts therefore sustain there requirements to transparently evaluate the workload of students and assign the credits accordingly. Also, the workload per semester needs to be balanced. On the formal side, the definition of one credit in terms of working hours needs to be clarified and harmonised in all official documents.

Criterion 1.6:

The experts acknowledge that HCMUS has increased the number of practical teaching hours in both programmes and positively highlight that lab work has been included in foundational modules like “Fundamentals of Materials Science”. They again stress the importance of hands-on practical experience, which is facilitated by the already made first lab investments (see section 3.3). Overall, they consider their initial recommendation to be fulfilled. Moreover, they are satisfied to see that the new curriculum draft of the BaMS contains a compulsory internship, which is crucial for the programme and required by the SSC. They consider their initial requirement to be fulfilled but recommend extending the internship beyond 5.25 ECTS (see above).

<u>Final assessment:</u>

The experts are highly satisfied with the improvements HCMUS has already implemented since the on-site visit. This mainly concerns the review and update of the curricula, which now constitute proper material science and technology programmes that are in line with the Subject-Specific Criteria. Moreover, the experts positively acknowledge the increase of practical teaching and learning elements in both programmes. Critical remains the question of the credit allocation, which, also in the revised curricula, shows a very imbalanced distribution of the student workload.

In summary, the experts consider this criterion to be **almost fulfilled**.

2. Exams: System, Concept and Organization

Criterion 2 Exams: System, concept and organization

Evidence:

- Self-Assessment Report
- Module handbooks of both programmes
- Exam regulations (Regulation on educational testing)
- Academic regulations
- Regulations on the procedure for registering and evaluation the practical internship course
- Samples of student's work (projects, exams and thesis)
- Discussions during the audit

Preliminary assessment and analysis of the experts:

As explained in the Self-Assessment Report, the Office of Educational Testing and Quality Assurance (OETQA) is responsible for the administration of the examinations, including exam planning, conversion, exam printing, exam storage, exam marking, exam management (mid-term, final semester), monitoring of exam results and student progress, as well as the quality assurance processes associated with the exam system.

The examination methods for each module depend on the respective learning outcomes, the teaching format and methodology, and the level of the module. The syllabi of the modules are distributed to the students in the first class of each module and contain a table that outlines the respective assessment forms and criteria, scores, and an exam question matrix to ensure validity, reliability, and fairness. Some modules have only one written or oral exams, while for others, the final grade is determined as a weighted average of multiple components, as outlined in the module handbooks. For internships, the teaching staff explains that the assessment is based on two reports, one to the company and one to the university.

The assessment of theoretical modules usually consists of three assessment parts: a final examination, a midterm examination, and a progress assessment component. The specific examination forms and their weighting for the final grade are outlined for each module in the module handbooks.

1. Progress assessments typically include Q&A, quick exercises, homework, reports, quizzes, or teamwork assignments and are designed to motivate students to participate more actively in class sessions. Depending on the module, the progress assessment component might be further diversified into attendance, exercises, presentations, and/ or discussion participation.
2. Midterm assessments occur mid-time of the semester and may consist of written exams, seminars, or reports. According to the exam regulations, written midterms usually take place in the eighth semester week and last 45 minutes. However, not every module requires a midterm exam.
3. Final assessments take place at the end of the course and can include written exams, seminars, or project assignments. Written final exams take place after the end of the lecturing period according to the exam schedule, which is to be announced at least one month prior to the first exam. The weight of the final exam ranges from 40-60% of the total grade.

The experts are generally satisfied with the variety of examination formats and assessment methods applied in both study programmes and confirm that their level generally corresponds to EQF level 6. However, the review of different examples of final exams and papers during the on-site visit confirms again that the teaching contents do not represent the domain of material science but rather, e.g., applied chemistry, applied physics, and biology, respectively medicine.

To be admitted to the final exam, students are required to attend at least 80% of theoretical classes respectively even higher shares for practical modules and successfully master the midterms and progress assessment components. Students who are not eligible to take the final exam without a valid reason must receive a zero score and have to repeat that module in the following semester. Amendments to the exam regulations outline transparent provisions regarding regulations and a code of conduct for the different exam format, as well as respective sanctions in case of violations.

According to the Self-Assessment Report, HCMUS actively encourages a feedback culture regarding exam performances between teaching staff and students. Lecturers can notify, interact, and give feedback directly to students in person or digitally through the university user accounts. This enables students to improve their knowledge and skills for the next examination. Exam scores are published on the website of the OETQA or the student portal. For midterm exams, inquiries and complaints are to be discussed directly between the lecturer and the student, while, for the final exams, students are also entitled to request a formal review of the final exam results.

As outlined in the academic handbook, all modules are graded based on a 10-point scale. The final grade is calculated as a weighted average of the individual exam component grades, is rounded to one decimal place, and converted according to the 4-point scale and grade as follows:

10-point scale	4-point scale	grade
9.0 to 10.0	4.0	A+
8.0 – below 9.0	3.5	A
7.0 – below 8.0	3.0	B+
6.0 – below 7.0	2.5	B
5.0 – below 6.0	2.0	C
4.0 – below 5.0	1.5	D+
3.0 – below 4.0	1.0	D
below 3.0	0.0	F

A module is passed only with a grade of 5.0 or higher. Students who do not pass the exam or miss it without a legitimate reason have to re-take the module in the following semester or year at additional tuition fees which depend on the number of credits of the module. In case of elective modules, students can choose whether to repeat the initially filed module or choose another option from the respective catalogue. In case of legitimate reasons for absence (e.g., illness, accident, unexpected personal circumstances), students can apply for exam postponement within five days from the original exam date. Furthermore, the students explain that they are allowed to repeat modules at extra cost if they want to improve their grades. They confirm to be satisfied overall with the exam system, the feedback, the re-take options and appeal structures, although the latter had never been used by any of the interviewed students. Nevertheless, the experts are pleased with this system. The suitability of the exam system is also evaluated on a regular basis through the student surveys, as the respective results show. The overall performance of students is measured by a grade point average (GPA) which is the average score across all modules weighted by their credit numbers.

For the final exam of the programmes, students have to choose one of the following options, as outlined in the Self-Assessment Report:

1. Students “with a passion for research and sufficient accumulated points” may opt for an undergraduate research graduation thesis. Alternatively, those interested in applying their knowledge in the working environment can undertake an industry-based project in collaboration with industry partners.
2. Students complete a graduation seminar (equivalent to 6 or 4 credits), alongside participating in relevant modules (worth 4 or 6 credits).

The valuation of graduation projects and theses is carried out by the Evaluation Council of Graduation Projects and Theses. As explained in section 1.3, the experts point out that, while the graduation theses are generally of an adequate quality, the provided examples of graduation seminar works do not fulfil the scientific standards and requirements of a Bachelor´s thesis. In this regard, they repeat their requirement to include the graduation thesis as a compulsory module for all students or alternatively raise the level of the project work to be in line with EQF 6.

In summary, the experts confirm that there are module-specific exams that assess the extent to which the defined learning outcomes have been achieved. The types of exams are specified for each module, and students are informed about the conditions for completing the module through the module handbooks. The experts further confirm that there are transparent rules for remedial exams, non-attendance, cases of illness, and that compensation measures for students with disabilities or special needs are in place if necessary. Examinations are marked according to transparent criteria, and a structure of committees ensures fairness and the opportunity for appeal. Students have the opportunity to consult their lecturers about the results of their exams. However, the graduation thesis needs to be mandatorily included in the curricula. The second option of the graduation seminar work is not feasible as it does not fulfil the required standard of a Bachelor´s thesis.

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

As referenced in section 1.3, HCMUS has introduced the Bachelor´s thesis as compulsory module in both programmes, which satisfies the experts.

<u>Final assessment:</u>

The experts are satisfied with the university´s examination system and its implementation. The consider this criterion to be **fulfilled**.

3. Resources

Criterion 3.1 Staff and Staff Development

Evidence:

- Self-Assessment Report
- Staff handbook
- Decision „On promulgating the regulation of working regime for lecturers"
- Examples of student feedback surveys
- Staff evaluation result report
- Faculty of Material Science staff website: https://mst.hcmus.edu.vn/nhan-su
- Discussion during the audit

Preliminary assessment and analysis of the experts:

As explained in the Self-Assessment Report, the Vietnamese higher education law defines three types of teaching positions: lecturers, senior lecturers, and principal lecturers. Each position comes with different rights and duties, as defined in the working regime regulation. Information on the staff members, including position, short CV, industry collaborations, research projects, and involvement in committees and university bodies is contained in the staff handbook of the faculty as well as on the university´s website. In terms of qualification, there are 19 PhD holders (out of which there is one professor and 6 associate professors), 19 Master´s degree holders, and two Bachelor´s degree holders.

In addition to the academic staff of FMST, staff of other faculties and departments is involved in the teaching activities of the programmes under review who mainly cover the basic modules of the general education stage. Moreover, guest lecturers regularly visit the university. The staff numbers are displayed in the following table taken from the Self-Assessment Report:

Major	Active students	Full-time Faculty Academic staffs	Full-time Academic Staffs of University who are responsible for General Modules	Visiting lecturers	Ratio of students/staff*
Materials Science	469	33	10	10	14.2
Materials Technology	321	34	6	9	9.4

While the experts consider the number of staff generally sufficient, they criticise that none of the staff members has a background in engineering, neither academically nor in terms of industry experience. This explains the lack of expertise in the technical components of material science and technology which constitutes one of the notable deficiencies in the curricular design (see section 1.3). The engineering perspective is crucial for the understanding of material processing and production, as well as for the incorporation of practice into the teaching methodology. The experts consider this fundamental for the setup of functioning study programmes in material science and technology, and therefore pose it as a prerequisite for the accreditation to recruit teaching staff with engineering background.

Moreover, the experts point out that the average academic qualification level of the staff body is comparatively low. In that regard, the number of academic staff with at least a PhD degree should be increased. The university representatives explain that there is an overall shortage of higher-qualified academic staff in Vietnam, as the opportunities to complete PhD degrees are limited in the country. To compensate for this, the university tries to recruit international staff and works with guest lecturers. However, the students report that guest lectures are still rare, infrequent, and mostly conducted online; meaning that no regular modules are fully and standard-wise taught by international guest lecturers. Moreover, part of HCMUS´ research funding goes to lecturers to obtain PhD degrees, either domestically or abroad.

To increase international experience, FMST regularly organises conferences with national and international academic partners to enhance professional knowledge in relevant fields of materials science and strengthen cooperative relationships with relevant institutes and organisations. Faculty members are encouraged to conduct short-term research visits and participate in scientific conferences related to materials science and technology. Funds are provided via a research grant budget of the FSMT or are acquired from different national institutions or funding schemes. During the on-site visit, the teaching staff confirms that there are opportunities to take part in conferences, but that the support is still limited. This is also reflected in the low number of teaching staff members who have completed a degree abroad or are taking part in ongoing projects with foreign universities. Thus, the overall level of international experience also remains low. In terms of staff development, the experts therefore recommend HCMUS to foster international staff mobility of their own teaching staff and enable them to complete doctoral degrees abroad to increase the international experience. Furthermore, international guest lecturers should be integrated more closely and extensively into the staff body. For the BaMS programme in particular, which is currently less practically oriented, the experts additionally recommend increasing the ties with relevant industries by including guest lectures by industry representatives in their teaching activities.

In terms of research, there is the Office of Science and Technology which is in charge of managing scientific and technological activities, scientific research centres, scientific research activities, technology transfer, international cooperative scientific research projects, the monitoring of scientific research activities, as well as student learning and student scientific research awards. Lecturers supervise undergraduate students in their research projects, include them in their own projects, and are required to update their research activities, including publications and research projects in the field. Active research of the faculty is fostered and encouraged with annual rewards to individuals and groups with excellent scientific research achievements. However, as the teaching staff reports, the financial resources are a limiting factor. For the realisation of research projects, the university´s own resources are not sufficient, and third-party funding is necessary. In this regard, the programme coordinators explain that industry collaborations should be enhanced in the future, which is positively noted by the experts. They additionally stress the importance and potential of international collaborations in that regard. The FMST staff´s research output of the past five years is summarised as follows:

Academic year	2019-2020	2020-2021	2021-2022	2022-2023	2023-2024
National journals	03	14	21	16	16
International journals	30	54	52	64	99

Besides research, there are also offers for continuous education of the staff members in the fields of personal development and didactics. Staff members are encouraged to improve didactics by attending various, annually held training courses. External lecturers are invited for continuous education of the lecturers. The staff confirms that several workshops and courses are organized on a regular basis for the further qualifications of the teaching staff, especially considering the recent introduction of the MT programme, which pleases the experts. As an example, a focus is on the training of online teaching skills and digital lecturing materials which has increased in importance since the Covid-19 pandemic.

Support staff includes teaching assistants, lab technicians, technical and service staff, as well as professional and clerical staff.

The composition, qualification, and performance of the staff members are regularly assessed based on the completion of their allocated teaching hours, research activities and output, and the participation in activities related to the “mission” of FMST. Also, an evaluation of the staff is part of the module surveys conducted among the students.

In summary, the experts find that the current staff composition does not adequately cover all relevant and necessary fields of material science and technology, as there are no staff members with backgrounds in engineering. The experts point out that engineering expertise is essential for the necessary curricular restructuring of the programmes to cover the full extent of the field of material science and technology. Therefore, they see it as a prerequisite for HCMUS to bring in academic staff with engineering backgrounds. Furthermore, the experts recommend supporting the staff members in completing doctoral degrees abroad and bringing in more guest lecturers to increase the overall academic qualification level and international experience of the staff body. Besides this, the experts confirm that the lecturers have different opportunities to further develop their professional and didactic skills and are supported in using corresponding offers. This also includes sufficient support for research; although, also in this regard, international cooperation should be further fostered. Moreover, the experts confirm that the staff is regularly evaluated.

Criterion 3.2 Student Support and Student Services

Evidence:

- Self-Assessment Report
- FMST consultation website: https://mst.hcmus.edu.vn/form-tu-van.html
- Discussion during the audit

Preliminary assessment and analysis of the experts:
According to the Self-Assessment Report, HCMUS´ student support system is based on a structure of different offices with defined responsibilities. These cover both academic as well as non-academic topics, as described in the Self-Assessment Report

- Academic Advisory Team: Support and consult students about the university rules and regulations as well as module registration and career orientation. Guide students in preparing individual study plans and track their progress and encourage students to participate in extracurricular activities and scientific forums.
- Office of Academic Affairs Office (OAA): Coordinate with faculties and relevant departments to develop, improve and deploy training programs, teaching methods, learning materials, and training activities for lecturers and students to improve quality train; implement training and academic management at university and college levels according to current regulations; develop and implement training plans

by semester and school year, coordinate with faculties to create timetables and organize course registration for students; coordinate with relevant departments to inspect and supervise teaching and learning and the conditions of facilities serving teaching and learning; collect, collect statistics, process and store information about students' academics; manage and confirm data on students' academic results, diplomas and graduation certificates.

- Office of Student Affairs (OSA): Develop regulations and plans for student management organisation; serve the legitimate interests of students; organise the monitoring, examination, and evaluation of the results and commendation of student work. Receive, exploit, and distribute sponsored scholarships to students from domestic and foreign organizations and businesses.
- Health Support Centre: Medical examination, first aid, and medicine for lecturers and students when necessary.
- Student Assistance Centre: Building an information system and service channels to support student life at the university. Career workshops, scholarships, soft skills, and student learning services are always updated regularly.
- Communist Youth Union organisations: Support for students during their learning process at the university. Students can participate in many academic and extracurricular activities, sports activities.

During the on-site visit, the students report that they feel well-supported by the university in both academic and non-academic domains and highlight the direct, personal communication channels between students and teaching staff as exceptionally positive. They explain that, besides the university-wide support bodies, each student is assigned an academic supervisor of the respective faculty at the beginning of their studies, who serves as the first reference person in case of any problems. The experts additionally learn about the concepts of “homework teachers” and “homeroom teachers” as part of the academic student support system. While the former refers to staff members who regularly supervise independent study times at the university, the latter describes additional individual teaching sessions for students who struggle academically. The experts consider this unusual for a university but recognise the extensive system of student support. Summary statistics of the student surveys since 2021 show an overall high level of satisfaction with the support facilities and prove the regular evaluation of the student services.

In summary, the experts confirm that HCMUS provides sufficient human resources and organisational structures for individual subject-specific and general counselling, supervision and support of students, as well as administrative and technical tasks. The allocated advice and guidance on offer assist the students in achieving the learning outcomes.

Criterion 3.3 Funds and equipment

Evidence:

- Self-Assessment Report
- List of laboratories and equipment
- Discussion during the audit

Preliminary assessment and analysis of the experts:

According to the Self-Assessment Report, the main income sources of the university are tuition fees and government funding. The Office of Finance and Planning is responsible for collecting the tuition fees and the mediation of scholarships. According to the university representatives, the financial resources pose a limit to certain investments of the university, which is currently dedicated to renovating and updating laboratory facilities. Still, all teaching and educational activities are ensured and are not affected by eventual temporary shortages.

The physical facilities of HCMUS are managed by the Office of Equipment Management. The university has 116 classrooms and four lecture halls, each of which is equipped with wi-fi, microphones, projector, boards, and a sound system. For practical classes and the research activities of staff and students, FMST has the following 12 laboratories, which are documented with their functionality, module designation, and equipment in the laboratory catalogue:

1. Multifunctional Materials Laboratory
2. Fundamental Materials Science Laboratory
3. Pilot-Scale Laboratory
4. Laboratory of Nano Materials Synthesis
5. Thin Film Material Synthesis Laboratory
6. Magnetic & Biomedical Materials Laboratory
7. Polymer Synthesis Laboratory
8. Polymer Analysis Laboratory
9. Polymer Practice laboratory

During the on-site audit, the experts visit multiple classrooms and laboratory facilities of the faculty which are located on two different campuses in the city. Given the considerable distance between the two campuses, the experts wonder about the practical organisation of lab courses and are assured that all students´ daily learning activities take place in either one or the other campus, eliminating the necessity of time-consuming transfers between classes, which pleases the experts. The experts note that the laboratory facilities also show the high specialisation level of the programmes and the missing foundations for the engineering-related aspects of material science. Moreover, they find that the laboratory spaces are very limited in size, making it difficult for all students to get hands-on experience with all necessary devices and experiments. The need for improvement regarding the lab facilities is confirmed by all stakeholders of the programmes. Students report that there is no modern equipment for many experiments and that, in many cases, they can only observe teachers presenting the experiments but not do them themselves. As the experts consider practical hands-on experience crucial for the education of the students, they require HCMUS to increase the available lab equipment. Besides that, representatives of potential employers also explain that, with the exception of the laboratory for polymers or PMCs, which contains newly acquired machines including a compounder, a printer, and an injection moulding unit, the available equipment does not match the current practices and demands of the industry. In that regard, the experts generally recommend strengthening industry cooperation to improve the technology transfer between the faculty and the industry and better align the students´ knowledge and skills of relevant machines with the industrial demands. Lastly, the experts also point out that many of the laboratory facilities do not comply with international safety standards, e.g., in terms of the safe storage of materials, safety measures for the use of large machines, and the availability of emergency routes and exits. They recognise the challenge of adhering to these standards given the limited financial resources but recommend HCMUS to improve the lab safety measures and ensure that they comply with international safety standards.

General learning facilities of the university include the library as well as the IT infrastructure. The central library of HCMUS provides books and articles from various journals covering different fields from natural science, social science, art, architecture, and engineering. Additionally, students and staff members can also access resources of the entire network of national universities of Vietnam. The central library also has online resources of the well-known publishing houses and databases, including ScienceDirect, Springer Link, and Proquest. According to the Self-Assessment Report, the system currently contains more than 400,000 copies of books, hundreds of magazine titles, and thousands of dissertations from different fields, as well as an electronic database with more than 26,000 electronic papers and 20,000 e-books. The library is open from 7:50 to 20:30 from Monday to Friday and 8:00 to 16:00 on Saturdays. The students confirm their overall satisfaction with the library.

In terms of digital facilities, the campuses are equipped with computer systems and wireless network access. All students receive an institutional e-mail address which gives them access to all digital services, including the applications of the Microsoft 365 suite. However, as mentioned in section 1.6, the introduction of a comprehensive learning management system would complement and benefit the digital infrastructure of HCMUS. While the experts positively comment on the general digital facilities, they remain uncertain about the subject-specific applications provided to the FMST students and therefore ask for a list of software programmes, licenses, and applications available to the students.

Further support facilities include dormitories and various sports facilities.

The facilities are regularly assessed by different stakeholder groups as part of the feedback surveys. It strikes that the satisfaction with the physical facilities and equipment ranks the lowest of all categories in these surveys which is mainly due to the limited resources for the renewal of equipment described above.

In summary, the experts confirm that the financial resources constitute a sustainable basis for delivering the degree programmes. While financial resources are limited for large investments into infrastructure, the experts nevertheless recognise HCMUS´ strive for the improvement of the physical facilities, which they deem to be necessary. Foremost, they require increasing the available lab equipment to ensure that all students can have adequate hands-on practical experience. Also, a qualitative update of many pieces of equipment is necessary, and the experts recommend in that regard, to foster technology transfer between the faculty and the industry. Moreover, the experts see the need for improving the safety standards in the lab facilities according to international work safety provisions. The facilities are regularly evaluated.

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

<u>Criterion 3.1:</u>

As part of its statement, HCMUS provides an updated version of the staff handbook and explains that the previously provided version did not properly reflect these credentials. Upon review, the experts confirm that multiple staff members have degrees in engineering and also engage in research related to engineering topics, which is also crucial for the delivery of the revised curricula. The experts deem their initial prerequisite to be fulfilled, but additionally recommend posing an increased focus on engineering experience when hiring new staff for the programmes to further increase the engineering expertise of the overall staff body. Besides that, the experts emphasize their recommendation to increase the number of PhD holders of the staff body and foster also staff mobility.

<u>Criterion 3.3:</u>

Since the on-site visit, HCMUS has invested in new laboratory equipment, including e.g. a Photoluminescence Spectrometer, a Nucleic Acid/ Protein Quantitative Spectrophotometer, a Universal Testing Machine, and an inverted microscope. Furthermore, the university provides a list of instruments and equipment of associated institutions which can also be used by students and staff of the programmes under review. The experts now deem the available resources to be generally sufficient but still point at the problem of occupational safety and equipment safety in the labs, which is required to be addressed.

Besides this, the experts stress their further recommendations to foster the technology transfer between university and relevant industry, as well as focussing on the improvement of the laboratory safety standards. In terms of digital facilities, to facilitate the study organisation, a comprehensive learning management system should be implemented.

Final assessment:

The experts acknowledge HCMUS´ explanations regarding the staff composition and engineering expertise, which corrects their initial impression after the on-site visit. They confirm that the engineering background of the staff is generally adequate for the delivery of the programmes but nevertheless recommend to further increase the expertise in this domain when hiring new staff. Moreover, they stress the importance of fostering higher qualification and internationalisation of the staff body. In terms of physical facilities, the university has already made significant progress with the procurement of additional equipment, but laboratory safety needs to be improved.

In summary, the experts consider this criterion to be **partly fulfilled**.

4. Transparency and documentation

Criterion 4.1 Module descriptions

Evidence:

- Self-Assessment Report
- FMST programme website: https://mst.hcmus.edu.vn/dao-tao-dai-hoc/chuong-trinh-dao-tao
- Module descriptions
- Discussions during the audit

Preliminary assessment and analysis of the experts:

There are well-structured and transparent module descriptions which complement the curricular overviews for both programmes and contain all the necessary content-related and practical information for the modules. This includes the course name, semester (course study time), name of the course coordinator, language of instruction, curriculum alignment, teaching methods, workload, credit points, course type, course credits, required and recommended prerequisites for module enrolment, module objectives/intended learning outcomes, course content, examination formats, study and examination requirements and a reading list. However, as mentioned in earlier parts of this report, the experts note several inconsistencies with respect to the credit allocation and completeness of the module descriptions and therefore require HCMUS to revise and harmonise the information in the module descriptions. As confirmed during the on-site visit, the module descriptions are internally accessible to all students and lecturers, which is acknowledged by the experts. To further increase transparency also for external interested parties, they recommend to additionally publish the module descriptions openly on the programmes´ websites.

Criterion 4.2 Diploma and Diploma Supplement

Evidence:

- Self-Assessment Report
- Sample Diploma Certificate for each degree programmes
- Sample Diploma Supplements for each degree programmes

Preliminary assessment and analysis of the experts:

According to the Self-Assessment Report, students are awarded a Diploma Certificate, and a Diploma Supplement, which also contains a Transcript of Records, which lists all the modules that the graduate has completed, the achieved credits, grades, and cumulative GPA. The experts positively acknowledge that all documents are issued bilingually in Vietnamese and English, and that also the awarded ECTS credit points are specified for each module. However, they notice that the title of the graduation thesis is not specified, which is recommended by the experts to increase the informational value about the students´ individual specialisation and research interest.

Concerning the Diploma Supplement, the experts express their satisfaction with the form and information contained, but notice that no statistical information is provided which enables the readers to assess the individual student performance in relation to, e.g., the cohort. Moreover, no information about the national education system is provided. These two shortcomings need to be addressed.

Criterion 4.3 Relevant rules

Evidence:

- Self-Assessment Report
- Academic regulations
- Regulations on working regime of lecturers
- All relevant regulations as published on the university´s and faculty´s websites

Preliminary assessment and analysis of the experts:

The academic regulations on the undergraduate level are the core regulatory document for both programmes under review. They are complemented by other specific rules and regulations as mentioned in this report. These regulations outline the responsibilities and rights of students and the university. Regulations for lecturers are defined separately.

The experts confirm that the rights and duties of both HCMUS and the students are clearly defined and binding. All rules and regulations are published on the university's website and hence available to all relevant stakeholders.

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

Criterion 4.1:

Concerning the noted inconsistencies in terms of the credit allocation and the respective documentation, HCMUS explains that a comprehensive review process has been initiated to address these inconsistencies. The experts appreciate this and already see significant improvement in the module handbooks provided as part of the university statement. For the further update and harmonisation of the documentation, the experts recommend to more stringently outline the module objectives in terms of knowledge, skills, and competences.

Besides that, the experts acknowledge that the module descriptions have now been published on the faculty´s website, which satisfies the experts´ initial recommendation.

Criterion 4.2:

As initially recommended, HCMUS now outlines the title of the Bachelor´s thesis on the Transcript of Records which is positively noted by the experts. Moreover, information on the national education system as well as statistical data regarding the relative student performance in relation to the cohort have been added. The experts positively comment on these improvements and consider the initial requirement and recommendation to be addressed already.

Final assessment:

Overall, the experts are satisfied with HCMUS´ revised documentation and the improvements in terms of the final documents. They consider this criterion to be **fulfilled**.

5. Quality management: quality assessment and development

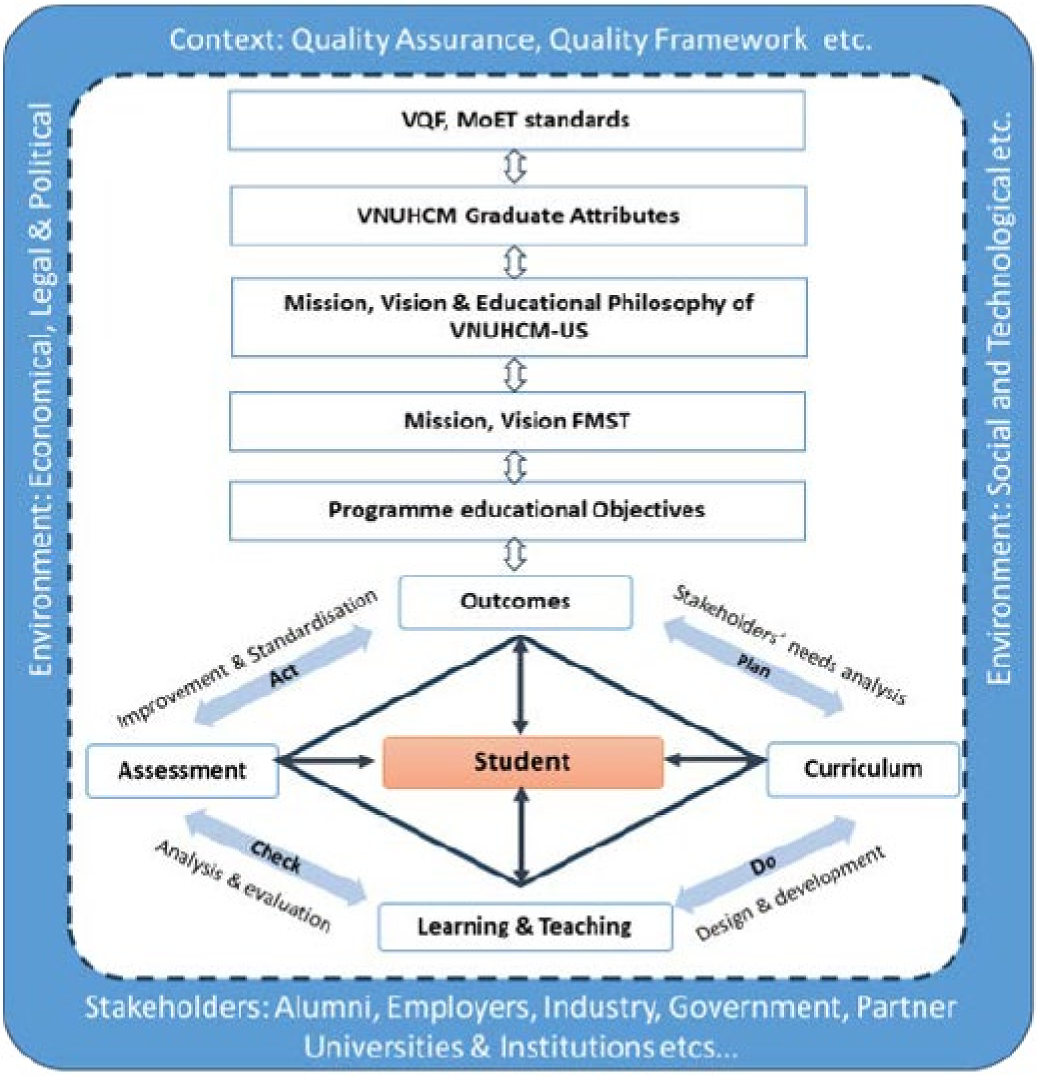
Criterion 5 Quality management: quality assessment and development

Evidence:

- Self-Assessment Report
- Exemplary feedback questionnaires
- Stylised feedback results
- HCMUS quality improvement reports website: http://ktdbcl.hcmus.edu.vn/index.php/cong-tac-dbcl/danh-gia-mon-h-c
- Discussions during the audit

Preliminary assessment and analysis of the experts:

According to the Self-Assessment Report, HCMUS´ quality management system includes both internal as well as external instruments of quality assurance. Various elements and examples of quality assurance measures have already been mentioned in previous parts of this report. The quality assurance framework is schematically displayed in the following figure taken from the Self-Assessment Report:



The internal system relies on regular evaluations of the programmes through feedback surveys by relevant stakeholders, including staff, lecturers, students, alumni, and industrial partners. The applied survey instruments and their purposes are listed in the following table taken from the Self-Assessment Report:

No.	Survey objective	Stakeholder	Method	Time	Referenced document
1	Student course evaluation: collecting feedback and evaluation of students on the course	Students	Online	Semesterly	Procedure for student's course satisfaction survey
2	Survey on recent graduates: - Collect students' feedback	Recent graduates	Online	Annually	Stakeholder survey procedure defined by the Faculty
3	Academic staffs' feedback on teaching activities: - Gather feedback from academic staffs on teaching activities.	Academic staffs	Online	Annually	OETQA
4	Alumni survey: - Gather information concerning alumni's employment status. - Gather alumni's feedback on learning outcomes and curriculum.	Alumni	Online	Annually	OETQA
5	Employer survey: - Gather employers' feedback on graduates. - Gather employers' feedback on learning outcomes and curriculum	Employer	Online	Annually	OETQA FMST

Templates of feedback questionnaires as well as stylised results of the different surveys of all stakeholder groups were presented as part of the documentation. The results of the survey instruments are monitored, discussed in management meetings, and respective measures to address shortcomings are planned. These activities are documented in annual quality improvement reports for each faculty, as well as separately for different university departments and offices, which are publicly available on the university website. Although the students state that they are not actively informed about the results of their feedback surveys, the experts consider these reports sufficient to close the feedback loop. However, they recommend making students aware of these reports and discussing the feedback and respective implemented measures with the students. As the experts note, the 2024 quality improvement report addresses multiple shortcomings which the experts also identify, including, e.g., the poor quality of the university infrastructure and the need for better industry cooperation and industry orientation of the graduate profile, which the experts acknowledge as a sign of a working internal quality assurance system. However, there is a pressing need for the implementation of these identified measures.

Besides these internal quality assurance procedures, external quality assurance is conducted through benchmarking with international universities and programme accreditation by agencies like the Asean University Network (AUN-QA). The university is increasingly pursuing the accreditation of its study programmes by international accreditation agencies for the purpose of international recognition, enhancement of quality standards, and increase of reputation. Both programmes under review are subject to international programme accreditation by ASIIN for the first time.

In summary, the experts confirm that both study programmes are subject to periodical internal as well as external quality assurance in a process that includes all relevant stakeholders. The results of these processes are incorporated into the continuous development of the programmes, although the implementation of many planned measures is still pending. The feedback loop is closed, but should be further improved by discussing the feedback results directly with the students. Nevertheless, the experts are satisfied with HCMUS´ quality assurance system and encourage the university to continue its path of international benchmarking for enhancing the programmes´ quality.

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

HCMUS does not comment on this criterion.

<u>Final assessment:</u>

Overall, the experts confirm that the quality assurance system of HCMUS satisfies the standards. For further improvement, the experts sustain their initial recommendation to discuss student feedback directly in class. The experts consider this criterion to be **fulfilled**.

E Additional Documents

Before preparing their final assessment, the panel asks that the following missing or unclear information be provided together with the comment of the Higher Education Institution on the previous chapters of this report:

- Table of outgoing and incoming student exchanges
- Table/ list of staff mobility and international projects
- List of software programmes/ licenses/ application available to the students
- Updated (draft of) Diploma Supplement for the 2024 MS/ 2022 MT curriculum

F Comment of the Higher Education Institution (27.08.2025)

The institution provided the following statement:

Please kindly click here to find the relevant exhibits to support our explanations or you can directly click on the links or evidence attached to each explanation		
Criteria	**ASIIN Questions**	**Explanation from VNUHCM-US to clarify all ASIIN Questions**
Criterion 1: The Degree Programme: Concept, Content & Implementation		
1.2	The programme names do not adequately correspond with the curricula, as also the curricula do not match the intended competence profiles (see section 1.3). Because of the very high specialisation on certain materials, the full breadth of the field of material science, respectively material technology as a subject that is built on the foundations of material science, is not captured. The experts can also not think of any title that would adequately describe the curricula in their current forms, which would, given the deficiencies in the design of the curricula, not be reasonable. Therefore, the experts consider this criterion to be not ful-	We found the ASIIN experts' comments to be invaluable as we continue our commitment to academic excellence. Our Bachelor of Science in Materials Science programme has been accredited in 2021 under AUN-QA standards, achieving the highest possible rating of "Exceeds Expectations". This serves as a strong foundation upon which we build further improvements. For your kind references, the AUN-QA assessment report and certificate were provided. To address the concern of the ASIIN experts that "the full breadth of the field of material science, respectively material technology as a subject that is built on the foundations of material science, is not captured", we have revised the curricula to strengthen foundational knowledge. The redesigned Bachelor of Science in Materials Science (BsMS25) and Bachelor of Science in Materials Technology (BsMT25) programmes now provide all students with a comprehensive education in core material groups before they begin specialization. The curriculum can access at MS25's link and MT25; 1. Bachelor of Science in Materials Science (BsMS)

	filled. The alignment of the ILO, programme titles and curricula is one of the experts´ prerequisites to consider the programmes under review for accreditation.	**New course:** Materials Chemistry (3 credits): Merges "Organic Chemistry" and "Transition and Non-transition Elements" into a single, integrated course. **Revised course**: Ceramic, Metal, and Semiconductor Materials (3 credits): Expands the previous "Metals, semiconductors, and insulators Materials" course to include ceramics. **New practical & modern skills courses**: Labwork - Fundamentals of Materials Science (2 credits): Adds early, hands-on laboratory experience. Material Simulation & Modelling (2 credits): Introduces essential computational skills. Impact of Materials on Economy and Environment (2 credits): Incorporates sustainability and resource efficiency into the core curriculum. Industrial internship (3 credits): not just limited to BsMT, now added to BsMS curriculum. 2. Bachelor of Science in Materials Technology (BsMT) **New courses**: Materials Chemistry (3 credits): merges the previous "Organic Chemistry" and "Transition and Non-transition Elements" to provide a cohesive understanding of the chemical principles underpinning all material classes **New core technology & industry courses:** Labwork - Fundamentals of Materials Science (2 credits): Provides fundamental hands-on skills.

		Manufacturing technology: Materials, Processes & Systems (2 credits): Strengthens the core technology focus. Green materials technology & circular Economy (2 credits): Adds a foundational course on sustainability. Labwork on Materials Chemistry (3 credits): provide hand-on practice of materials chemistry. These changes ensure alignment between our programme names, curricula, and Intended Learning Outcomes (ILOs): The learners now gain foundational knowledge in key material groups (polymers, composites, metals, ceramics, semiconductors) and modern methods before specializing. The strengthened core curricula provide the broad scientific and technological base that justifies the "Materials Science" and "Materials Technology" programme titles. Specializations now function as in-depth studies built upon this common foundation. The new courses are explicitly designed to meet ILOs by ensuring students gain a solid understanding of materials science principles across a wider spectrum of the field. In the context of continuous improvement of the program, FMST initiated the internal quality assessment in 2024. In this process, we revised and quantitatively evaluated the level of achievement of each course learning outcome as well as their contribution to program intended learning outcome. The IQA process is here.
1.3	The experts require the programmes to include the thesis as a compulsory module in both programmes without exception. Alternatively, the level of the final project has to	We have already made the 10-credit Graduation Thesis a compulsory module in both the Bachelor of Science in Materials Science (MS25) and the Bachelor of Science in

	be raised in order to correspond to EQF level 6. Moreover, as further elaborated below, the experts point out that the topics of both thesis and project work mostly do not align with the ILO of material science and material technology.	Materials Technology (BsMT25) programs, without exception. The alternative options, such as the Graduation Seminar combined with elective courses, were removed from the curricula for all future cohorts.
	The experts assess the current extent (three semesters) and selection of specialisations to be very heterogeneous and designed in a way that does not enable students to really specialise in the sense of material science. In relation to the basic curriculum, the specialisations each contain the application of a limited number of material applications but do not form a coherent whole. This becomes apparent in the presented examples of final theses which, although adequately representing the Bachelor´s level, do rarely contain topics and apply methods of material science and/ or technology, but rather applied chemistry, physics, or biology. While chemistry and physics are at least related to material science, biology is a subject without direct relation to the discipline. As another piece of evidence in that regard, the experts examine different products and objects produced as part of the teaching and	We understand the concern that our specializations may appear "heterogeneous" and not allow for deep specialization. Our benchmarking analysis, however, shows that our curriculum structure is quite robust. Depth of specialization: The Bachelor of Science in Materials Science (BsSMS) program dedicates 34 credits (~55 ETCS) to specialization, which is significantly more than its direct national competitors, such as University of Technology, VNU-HCM (HCMUT) (25 credits) and Ho Chi Minh University of Technology and Education (HCMUTE) (20 credits). The program's ratio of foundational to specialized credits (2.5:1) is the most specialization-focused among the compared Vietnamese universities. The BSMT program's 26 specialization credits (~48 ETCS) are also comparable to those of its peers. This data directly proves that the programs enable students to specialize. Coherence of specializations: The specializations offered, such as Polymer & Composite and Semiconductor Materials, are not arbitrary but are standard, globally recognized sub-fields. These areas are common across many benchmarked institutions, including HCMUT, HCMUTE, and National Tsinghua University (NTHU), confirming their relevance and coherence within the discipline. **On the role of biology and the biomedical specialization**

	research projects, such as a fluid fertiliser as an exemplary product for the specialisation in biomedical materials. As the experts stress, thi s is a product related to biology and chemistry, respectively agriculture, but is clearly not connected to material science.	We respectfully disagree with the assertion that biology has "no direct relation to the discipline". The inclusion of biomedical materials is a forward-looking decision aligned with major international trends. A key finding from our benchmark is that National Tsinghua University (NTHU), a top-tier technical university in Taiwan, offers a dedicated "Biomedical Industry" track alongside traditional fields like metals and microelectronics. This provides powerful external validation that biomedical materials is a major, modern specialization within the field, not an unrelated subject. Our inclusion of biology is structured and intentional. The programs feature dedicated courses like "Specialized Biology" and "Tissue Technology" to build a proper foundation for this specialization. We did carefully revise and update the modules handbooks of these modules for your references (BsMS Handbook, BsMT Handbook). We acknowledge that the "fluid fertilizer" example was poorly articulated and caused confusion. A more accurate, materials-centric description of such a project is "developing a biodegradable polymer matrix for controlled nutrient release". This reframes the work as a classic materials science challenge focused on structure-property relationships, which is the true intent of such projects. **On the nature of Final Theses** We agree that the distinction between a pure applied science thesis and a materials science thesis is crucial since materials science is an inherently interdisciplinary field that applies principles from physics, chemistry, and biology. While it is natural for a thesis to heavily utilize methods from a foundational science, we acknowledge the experts' viewpoint. To ensure clarity, we will continue to review

		and reinforce our thesis guidelines to mandate that the central research question must be a materials science and technology problem, explicitly focused on the structure-property-processing-performance relationship. We are also taking steps, inspired by models at ETH Zurich, Uni-Saarland and NTHU, to improve the visual presentation of our curriculum's pathways to make the link between foundational courses and specializations more explicit for all stakeholders. For your kind references, the lists of thesis' topics along with the abstracts of two recent years, cohort 20 and 21 were added at this link.
	The experts note during the interview session with the representatives of potential employers and professional associations that, in the first place, the major share of participants stems from research institutions which again contradicts the proclaimed industrial focus of the programmes, and, secondly, that the representatives of industrial companies do not embody companies with genuine material science applications. Instead, most people work within the limited area of one of the materials, most prominently, in jobs that the experts categorise more as applied natural sciences. The experts find that this does not fulfil the claim of material science, respectively technology. In this regard, the experts recommend, as part of the required overall review	We acknowledge your observations about the stakeholders present during the interview. The group present was not fully representative of the broad spectrum of our industrial partnerships and the diverse career paths of our graduates. Our students and graduates are employed across many core fields of materials science and technology. We have strong and active relationships with leading companies in various sectors (list), including: Semiconductors & Electronics: On Semi, First Solar, and II-VI Advanced Materials Vietnam (for electronic and photonic materials). Advanced Materials: Hyosung, Samsung display, which produces advanced materials such as carbon fibers and biomedical materials. Polymers & Plastics: Major companies such as Buyo, Duy Tan Plastics, Kien Duc Plastics. This diverse range of employers demonstrates that our programs have a genuine industrial focus that extends well beyond applied natural sciences and covers multiple, distinct materials sectors.

	of the curricula, to restructure the specialisations and focus on the two main classes of materials, which are polymers and advanced (respectively specialised) materials (containing nanotechnology, thin coating, and natural materials). This would allow for an adequate extent of specialisation without losing the focus on the overall material science perspective and the dispersion of both human, financial, and material resources due to the manifold specialisations.	
	The experts stress that practical application needs to be included from the beginning of the studies on, and that all students have to acquire hands-on experience with basic testing methods, e.g. tensile tests, themselves. This also goes along with the insufficient laboratory facilities and equipment (see section 3.3). In general, it would be crucial to include more individual laboratory work and reports as well as team-oriented project work into the modules.	We completely agree with your assessment that practical application and hands-on experience are crucial from the very beginning of the studies. We took this comment seriously and redesigned our curriculum (MS25, MT25, module handbook of BsMS, BsMT) with more courses with labworks or practice as described in response to the first comment. Detailed that the MS25 curriculum has the total practices, exercises periods increase from 31% to 42%, and in MT25 curriculum, these practice periods increase from 39% to 52% without changing the overall credit too much. In addition, the facilities have been invested for more experimental equipment (List of equipment invested in 2025)
	The curriculum is the topicality in terms of recent global challenges and the relevance of materials for them is barely covered by	We thank the experts for highlighting the importance of aligning the curriculum with current global challenges such as climate protection, resource efficiency, cost-effectiveness, and digitalisation. We fully acknowledge the need to ensure that these topics are systematically and visibly integrated into the programme structures.

	the curricula. Topics like climate protection, resource efficiency, cost-effectiveness, and digitalisation are crucial considerations in today´s production and use of materials. The programme coordinators explain that a new specialisation in renewable energy material technology was recently implemented in the BaMT programme, and that these topics are covered within other modules in both programmes. However, the experts do not find this reflected in the module handbook and also point out that the designated teaching hours do not suffice to include these considerations in addition to the general content of the modules. In this regard, the experts refer again to the need for a more extensive coverage of the properties and applications of all the above-mentioned material groups, as only this knowledge can enable students to compare and critically reflect on these global challenges in material science. Therefore, as part of the required restructuring of the programmes, these topics need to be suitably included in the programmes.	The programme has recently introduced a specialisation in Renewable Energy Material Technology, and aspects of sustainability and modern material applications are already addressed within several existing modules in both programmes. ● Impact of Materials on Economy and Environment (2 credits, 3 ETCS): Incorporates sustainability and resource efficiency into the core curriculum. ● Green materials technology & circular Economy (2 credits, 3 ETCS): Adds a foundational course on sustainability. The details of these modules can be seen in the updated module handbooks.

	The practical teaching hours should be higher in the BaMT programme to strengthen the industry-oriented, applied profile of the programme.	We appreciate the experts' recommendation to increase the number of practical teaching hours in the BsMT programme in order to reinforce its industry-oriented and applied profile. In response, the faculty has reviewed the current allocation of contact hours and practical components in relevant modules. As part of the upcoming curriculum revision (MT25, MS25, Module Handbooks of BsMS and BsMT), we have increased the proportion of laboratory work, project-based learning, and industry-related practical activities to better align the programme with professional requirements and the expectations of employers. **New core technology & industry courses:** ● Labwork - Fundamentals of Materials Science (2 credits, 4 ETCS): Provides fundamental hands-on skills. ● Manufacturing technology: Materials, Processes & Systems (2 credits, 3.5 ETCS): Strengthens the core technology focus. ● Labwork on Materials Chemistry (3 credits, 6 ETCS): provide hand-on practice of materials chemistry.
	The experts state that both programmes´ current curricula are not in accordance with the applicable SSC for material science and technology programmes, and do not constitute a basis for students to attain the ILOs. The curricular contents miss the overall scope of material science and technology programmes in different aspects. Therefore,	As mentioned in response to the comment on criterion 1.3, we have implemented a comprehensive reorganization of the fundamental stage of both the BsMS and BsMT programs (MT25, MS25). Our primary goal was to broaden the curriculum to cover the full scope of the field, as the experts recommended. We have introduced new core courses and revised existing ones to ensure all students receive a robust education in key material groups (polymers, metals, ceramics, composites, semiconductors) and modern methods like simulation before they begin to specialize. This directly addresses the need for a stronger, more integrated scientific foundation that aligns with the SSC. The detail desbrided of these contents have shown in the updated module handbook (BsMS, and BsMT).

	the experts see the need for a comprehensive redesign of the curricula and see two possible approaches: 1. Reorganisation only of the fundamental stage of both programmes concerning the provisions of the SSC, including the full range of subjects relevant to material science, and their respective integration. Consecutive specialisations should be chosen in reasonable and interrelated fields. Given the newly established laboratories, the experts would deem polymers and fibrereinforced polymers as two reasonable directions. In this case, the specialisations should constitute an applied focus, and the programmes need to be denominated accordingly (e.g., "Applied Material Science" or "Specialised Material Science"). 2. Reorganisation of the entire programmes with respect to the provisions of the SSC to allow students the acquisition of the relevant knowledge and skills in the full extent of material science to justify the programme name. Specialisations might be included to a lower extent as elective modules.	

	The experts require to include an industrial internship also in the curriculum of the BaMS programme as outlined also by the applicable SSCs. Besides this, the Bachelor´s thesis needs to be included as a compulsory module without elective alternatives in both programmes.	In the new curriculum of BsMS programme (MS25), the module Industrial Internship (3 credits, 5.25 ETCS) is added (The updated MS module handbook, table of MS modules changes). Students usually work at a company for 6 weeks, 15 hours/week. As already mentioned in response to comment on criterion 1.3, we have already made the 10-credit Graduation Thesis a compulsory module in both the Bachelor of Science in Materials Science (MS25, study plan MS25 and BsMS Handbook) and the Bachelor of Science in Materials Technology (MT25, study plan MT25 and BsMT Handbook) programs, without exception. The alternative options, such as the Graduation Seminar combined with elective courses, have already been removed officially from the curricula for all future cohorts. The changes have been presented in the SAR and summary in this tables.
	For curriculum, the experts encourage both national and international benchmarking, which also needs to be a first step for the required curricular restructuring.	Our faculty has completed a comprehensive benchmarking study, analyzing the curricula of several leading universities. The insights from this process have been instrumental in guiding our current curriculum review. Our benchmarking partners included: **National Benchmarking:** Ho Chi Minh City University of Technology (Bach Khoa - HCMUT) Ho Chi Minh City University of Technology and Education (Su Pham Ky Thuat - HCMUTE) **International Benchmarking:** Clausthal University of Technology (Germany) National Tsinghua University (NTHU) (Taiwan) ETH Zurich (Switzerland)

		Saarland University (Germany) We believe that this benchmarking has allowed us to restructure our curricula effectively to be more competitive and comprehensive.
	For Internationalisation and student mobility, the available number of places should be increased, and both incoming and outgoing students should be supported with respect to the outlined bottlenecks of the programmes. Overall, the experts therefore recommend fostering both outgoing and incoming student mobility.	Our data of the outgoing and incoming student exchanges updated via link and the relevant evidence also updated via link Currently, the faculty is committed to taking proactive steps to foster both outgoing and incoming student mobility. To achieve this, we will: - Work on increasing the number of available exchange places by seeking new international partners and expanding our existing agreements. - Conduct a thorough review of our current processes to identify and address the administrative and academic bottlenecks that can hinder student exchange. - Improve the support policies for both incoming and outgoing students to ensure a smoother and more integrated experience.
1.5	The implementation of the credit system is defective as multiple modules are left out of the total credit calculation, and the designated workload per semester is very unbalanced which makes the experts doubt that the workload allocation is realistic and well-founded. This is not surprising given that the workload of the students is not properly monitored and evaluated. Consequently, students have problems coping with the workload and completing the programmes	Our university operates on a credit-based system where students accumulate credits for each course module according to a personal study plan. To prevent overload and ensure a balanced workload, our formal academic regulations specified via link https://academic regulation include several key provisions: - There is a standard maximum registration limit of 25 credits per semester. - In exceptional cases where a student wishes to exceed this limit, they must submit a formal request that requires approval from both the Faculty and the University Rector. This safeguard is designed specifically to prevent students from taking on an unrealistic academic burden.

	within the designated timeframe. The experts therefore require HCMUS to address these deficiencies.	- The total credit count for a semester includes all modules a student is enrolled in, including newly registered courses, courses being retaken, and courses taken for grade improvement. - We regularly assess student academic load through student workload surveys conducted at two levels: - Course Surveys at the end of each module. - Program Surveys for the entire course of study. The most recent data from our course surveys (conducted in 2024) and program-level feedback indicate that students are, in fact, 80% satisfied with their academic workload. This direct feedback suggests that our students are coping well within the structured credit system.
1.6	A point of critique is the extent of practical teaching which should be increased, especially in terms of basic tests and experiments in the first basic modules of the programmes.	We acknowledge the experts' concern regarding the extent of practical teaching, particularly in the early stages of the programmes. To address this, FMST has revised the first-year basic modules to include more hands-on components such as fundamental experiments, demonstrations, and basic laboratory tests. **New practical & modern skills courses (Module handbook of BsMS and BsMT):** ● Labwork - Fundamentals of Materials Science (2 credits): Adds early, hands-on laboratory experience. ● Material Simulation & Modelling (2 credits): Introduces essential computational skills. ● Manufacturing technology: Materials, Processes & Systems (2 credits): Strengthens the core technology focus.

		● Labwork on Materials Chemistry (3 credits): provide hand-on practice of materials chemistry. ● Previously, there were many subjects in the program that were presented as taught only in theory, however, the actual teaching had practice or applied exercises. This happened because of the total limit set by the university. As suggested by ASIIN this time, we addressed these facts and presented the actual teaching periods, therefore, the total number of periods for practices and exercises increased for both MS and MT, as presented above.
Criterion 2 Exams: System, Concept and Organisation		
2	The graduation thesis needs to be mandatorily included in the curricula. The second option of the graduation seminar work is not feasible as it does not fulfil the required standard of a Bachelor´s thesis.	As in response to comment on criterion 1.3, we have already made the 10-credit Graduation Thesis a compulsory module in both the Bachelor of Science in Materials Science (MS25, study plan MS25) and the Bachelor of Science in Materials Technology (MT25, study plan MT25) programs, without exception. The alternative options, such as the Graduation Seminar combined with elective courses, have been removed from the curricula for all future cohorts. All changes in curriculum has been updated in the SAR.
Criterion 3.1 Staff and Development		
3.1	The experts find that the current staff composition does not adequately cover all relevant and necessary fields of material science and technology, as there are no staff members with backgrounds in engineering. The experts point out that engineering expertise is essential for the necessary curricular restructuring of the programmes to	We appreciate the opportunity to clarify the engineering expertise within our faculty and apologize for any misunderstanding caused by our documentation. In fact, nine members of our academic staff hold PhDs and Master of Engineering. We have attached the relevant diplomas in this folder. We believe this discrepancy arose because our staff handbook, the document you reviewed, does not properly reflect these credentials. We sincerely apologize for this oversight and have seriously revised

	cover the full extent of the field of material science and technology. Therefore, they see it as a prerequisite for HCMUS to bring in academic staff with engineering backgrounds.	and modified this official documentation to accurately represent our faculty's expertise (the updated Staff Handbook). Beyond formal degrees, the majority of our staff's research is in materials engineering, where the primary goal is to apply materials in real-world applications and analyze their performance. Current research projects focus on practical challenges such as: Developing novel materials for pollutant treatment in water and air. Creating advanced sensors for gas detection in industrial and environmental settings. Synthesizing and testing materials for renewable energy applications. Synthesizing and testing nano-materials for green agriculture applications… This application-driven research demonstrates our inherent engineering focus. To further ensure our curriculum covers the full breadth of materials technology, we regularly invite senior engineers and managers from leading companies to co-teach specialized courses (list of invited speakers were described in the updated staff handbook). This collaborative model is a strategic part of our program. It allows us to complement our core faculty's expertise, particularly in highly specialized or rapidly emerging areas. We are confident that the combined strength of our academically qualified staff, our application-driven research, and our deep collaboration with industry partners provides the necessary expertise to successfully implement the curriculum restructuring and cover the full extent of the materials science and technology fields.

3.3	The experts require increasing the available lab equipment to ensure that all students can have adequate hands-on practical experience. Also, a qualitative update of many pieces of equipment is necessary, and the experts recommend in that regard, to foster technology transfer between the faculty and the industry. Moreover, the experts see the need for improving the safety standards in the lab facilities according to international work safety provisions. The facilities are regularly evaluated.	We appreciate the experts' recommendations regarding the enhancement of laboratory resources and safety standards. To support hands-on practical experience for all students, the faculty has initiated an assessment of current laboratory equipment and is developing an acquisition plan to increase the number of available devices: ● 19 instruments were purchased in 2025 (list) which can be used for many practice modules and graduation thesis as described in this exhibit. ● Additionally, there are many analysis instruments that students can operate in our collaborations as listed here. Improving safety in our laboratory facilities is also a central focus. We are reviewing our procedures and infrastructure to ensure compliance with international work safety standards, including updated protocols, training programs, and facility improvements. The laboratories continue to undergo regular evaluations, and the findings from these evaluations will guide the staged implementation of the planned measures.
Criterion 4.1 Module Descriptions		

4.1	The experts note several inconsistencies with respect to the credit allocation and completeness of the module descriptions and therefore require HCMUS to revise and harmonise the information in the module descriptions. As confirmed during the on-site visit, the module descriptions are internally accessible to all students and lecturers, which is acknowledged by the experts. To further increase transparency also for external interested parties, they recommend to additionally publish the module descriptions openly on the programmes´ websites.	We thank the experts for their observations regarding the credit allocation and the completeness of the module descriptions. In response, HCMUS has initiated a comprehensive review to revise and harmonise all module descriptions across the programmes. As confirmed during the on-site visit, the module descriptions are already available internally to students and lecturers through the faculty's learning management system. To further enhance transparency and accessibility for external stakeholders, we are preparing to publish the revised module descriptions on the programme websites (BsMS, BsMT) .
4.2	The experts notice that the title of the graduation thesis is not specified, which is recommended by the experts to increase the informational value about the students´ individual specialisation and research interest.	To increase the informational value and better reflect each student's individual specialisation and research interests, The title of the graduation thesis is clearly specified on the diploma supplement. The revised diploma supplement is updated via link https://updated diploma supplement
	Concerning the Diploma Supplement, the experts express their satisfaction with the form and information contained, but notice that no statistical information is provided which enables the readers to assess the individual student performance in relation to, e.g., the cohort. Moreover, no information	Our diploma supplement has been updated with all the information as recommended, including the statistical information that helps readers better understand student performance, as well as the framework of our national education system. The revised diploma supplements are updated via link https://updated diploma supplement for your kind consideration.

	about the national education system is provided. These two shortcomings need to be addressed.	
D	Before preparing their final assessment, the panel asks that the following missing or unclear information be provided together with the comment of the Higher Education Institution on the previous chapters of this report: - Table of outgoing and incoming student exchanges - Table/ list of staff mobility and international projects - List of software programmes/ licenses/ application available to the students - Updated (draft of) Diploma Supplement for the 2024 MS/ 2022 MT curriculum	For exhibits related to "Table of outgoing and incoming student exchanges; Table/ list of staff mobility and international projects; List of software programmes/ licenses/applications available to the students", we have sent them to you via email on 26 June 2025. Please click here to find the file including these exhibits that we submitted to you before for your kind consideration. All the modifications have been modified in the updated SAR. The updated (draft of) Diploma Supplement for the MS' cohort 2025 . This update is necessary due to significant revisions in the program structure. A transition from the 2024 curriculum to the 2025 curriculum is not feasible for the current cohort. Many foundational subjects already completed by the 2024 cohort have been modified or replaced in the revised 2025 curriculum. This discrepancy makes a smooth transition impossible. Therefore, the 2025 curriculum will apply exclusively to the incoming 2025 cohort.

G Summary: Expert recommendations (04.11.2025)

Taking into account the additional information and the comments given by HCMUS, the experts summarise their analysis and **final assessment** for the award of the seals as follows:

Degree Programme	ASIIN Seal	Accredited by German Engineers	Maximum duration of accreditation
Ba Material Science	With requirements for one year	With requirements for one year	30.09.2031
Ba Material Technology	With requirements for one year	With requirements for one year	30.09.2031

Requirements

For all programmes

A 1. (ASIIN 1.3/ 1.5) Transparently evaluate the workload of students and assign the credits accordingly. The workload per semester needs to be balanced.

A 2. (ASIIN 1.5) The definition of one credit in terms of working hours needs to be clarified and harmonised in all official documents.

A 3. (ASIIN 3.3) Improve the occupational and equipment safety standards of the laboratories to comply with international standards.

Recommendations

For all programmes

E 1. (ASIIN 1.3) It is recommended to further foster both outgoing and incoming student mobility.

E 2. (ASIIN 1.6/ 3.3) It is recommended to implement a comprehensive Learning Management System.

E 3. (ASIIN 3.1) It is recommended to increase the number of staff who hold at least PhD degrees, foster staff mobility, and bring on international guest lecturers to improve the international experience of the staff.

E 4. (ASIIN 3.1) It is recommended to focus of engineering expertise as selection criterion for academic staff of the programmes.

E 5. (ASIIN 3.3) It is recommended to improve the technology transfer between the faculty and the industry.

E 6. (ASIIN 4.1) It is recommended to more stringently outline the module objectives in terms of knowledge, skills, and competences.

E 7. (ASIIN 5) It is recommended to discuss the student feedback in class.

For Ba MS

E 8. (ASIIN 1.3/ 1.5) It is recommended to increase the time and credits allocated to the internship.

E 9. (ASIIN 1.6/ 3.1) It is recommended to include guest lectures from the industry.

H Comment of the Technical Committee 05 – Material Science, Physical Technologies (24.11.2025)

Assessment and analysis for the award of the ASIIN seal:

The TC discusses the procedure which was originally concluded with two prerequisites and multiple requirements. However, the university's statement demonstrated that many of these had already been addressed, for example, by changing the curriculum and providing a list of new equipment ordered for the laboratories. However, it is remarked that it was not possible to ascertain whether these changes have already been implemented or when exactly it will happen. Therefore, the TC states that it is imperative that the experts' group check in a year's time whether the changes described in the statement have been implemented. The university needs to be informed about that.

The Technical Committee 05 – Materials Science, Physical Technologies recommends the award of the seals as follows:

Degree Programme	ASIIN Seal	Accredited by German Engineers	Maximum duration of accreditation
Ba Material Science	With requirements for one year	With requirements for one year	30.09.2031
Ba Material Technology	With requirements for one year	With requirements for one year	30.09.2031

Requirements

For all programmes

A 1. (ASIIN 1.3/ 1.5) Transparently evaluate the workload of students and assign the credits accordingly. The workload per semester needs to be balanced.

A 2. (ASIIN 1.5) The definition of one credit in terms of working hours needs to be clarified and harmonised in all official documents.

A 3. (ASIIN 3.3) Improve the occupational and equipment safety standards of the laboratories to comply with international standards.

Recommendations

For all programmes

E 1. (ASIIN 1.3) It is recommended to further foster both outgoing and incoming student mobility.

E 2. (ASIIN 1.6/ 3.3) It is recommended to implement a comprehensive Learning Management System.

E 3. (ASIIN 3.1) It is recommended to increase the number of staff who hold at least PhD degrees, foster staff mobility, and bring on international guest lecturers to improve the international experience of the staff.

E 4. (ASIIN 3.1) It is recommended to focus of engineering expertise as selection criterion for academic staff of the programmes.

E 5. (ASIIN 3.3) It is recommended to improve the technology transfer between the faculty and the industry.

E 6. (ASIIN 4.1) It is recommended to more stringently outline the module objectives in terms of knowledge, skills, and competences.

E 7. (ASIIN 5) It is recommended to discuss the student feedback in class.

For Ba MS

E 8. (ASIIN 1.3/ 1.5) It is recommended to increase the time and credits allocated to the internship.

E 9. (ASIIN 1.6/ 3.1) It is recommended to include guest lectures from the industry.

I Decision of the Accreditation Commission (12.12.2025)

Assessment and analysis for the award of the subject-specific ASIIN seal:

The Accreditation Procedure discusses the procedure and recognises the progress and development of the programmes which has already been made since the on-site visit. The Accreditation Commission agrees with the Technical Committee that it is important to follow up on the implementation of the initiated measures, especially the revised curricula, and decides to formalise this as an additional requirement (A4). Moreover, the Accreditation Commission refines the formulation of E3 to avoid misunderstandings and stress that this recommendation concerns the academic teaching staff.

The Accreditation Commission decides to award the following seals:

Degree Programme	ASIIN Seal	Accredited by German Engineers	Maximum duration of accreditation
Ba Material Science	With requirements for one year	With requirements for one year	30.09.2031
Ba Material Technology	With requirements for one year	With requirements for one year	30.09.2031

Requirements

For all programmes

A 1. (ASIIN 1.3/ 1.5) Transparently evaluate the workload of students and assign the credits accordingly. The workload per semester needs to be balanced.

A 2. (ASIIN 1.5) The definition of one credit in terms of working hours needs to be clarified and harmonised in all official documents.

A 3. (ASIIN 3.3) Improve the occupational and equipment safety standards of the laboratories to comply with international standards.

A 4. (ASIIN 5) Demonstrate that the changes described in the university’s statement have been implemented.

Recommendations

For all programmes

E 1. (ASIIN 1.3) It is recommended to further foster both outgoing and incoming student mobility.

E 2. (ASIIN 1.6/ 3.3) It is recommended to implement a comprehensive Learning Management System.

E 3. (ASIIN 3.1) It is recommended to increase the number of teaching staff who hold at least PhD degrees, foster teaching staff mobility, and bring on international guest lecturers to improve the international experience of the staff.

E 4. (ASIIN 3.1) It is recommended to focus of engineering expertise as selection criterion for academic staff of the programmes.

E 5. (ASIIN 3.3) It is recommended to improve the technology transfer between the faculty and the industry.

E 6. (ASIIN 4.1) It is recommended to more stringently outline the module objectives in terms of knowledge, skills, and competences.

E 7. (ASIIN 5) It is recommended to discuss the student feedback in class.

For Ba MS

E 8. (ASIIN 1.3/ 1.5) It is recommended to increase the time and credits allocated to the internship.

E 9. (ASIIN 1.6/ 3.1) It is recommended to include guest lectures from the industry.

Appendix: Programme Learning Outcomes and Curricula

The following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved by the Ba Material Science programme (BaMS):

General objectives

STT	Goals (MT or G)	Goal Met
KNOWLEDGE		
1	MT1.1	Apply knowledge of mathematics, physics, chemistry, computer science, and basic social sciences while gaining a deep understanding of the principles governing the properties and applications of materials.
2	MT1.2	Apply theoretical knowledge and research skills to develop materials with specific properties based on scientific principles.
SKILLS		
3	MT2.1	Ability to work in a team and have the skills to perform scientific work independently when doing assignments as well as presenting and discussing the results of the work.
ATTITUDES		
4	MT3.1	Develop the skills and mindsets necessary for lifelong learning, including the ability to evaluate new information, adapt to evolving technological and professional landscapes, and actively seek opportunities for ongoing personal and professional development.
PROFESSIONAL RESPONSIBILITY		
5	MT4.1	Commit to act in accordance with professional ethics, responsibilities and workplace regulations.

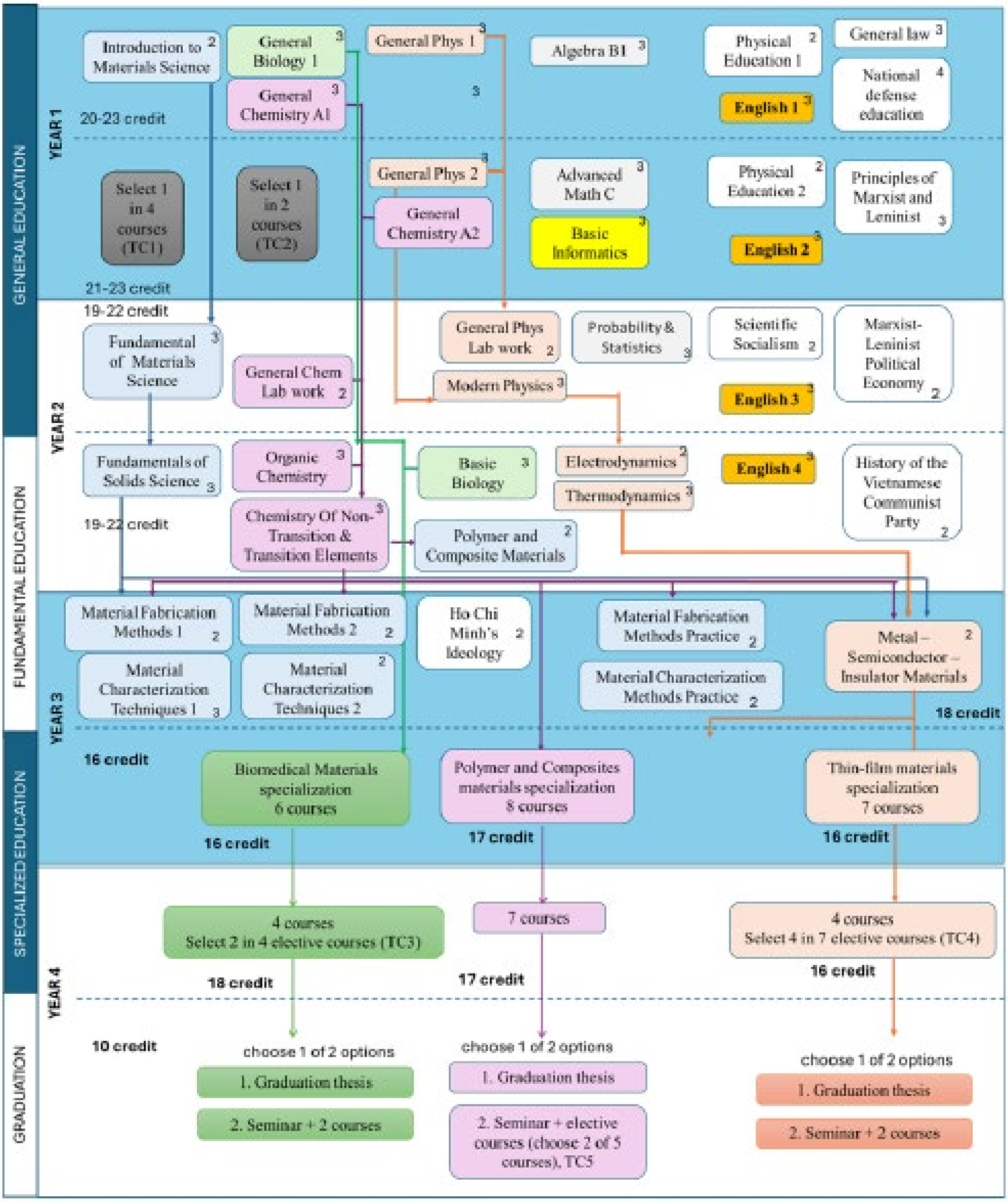
Intended Learning Outcomes

Labels	Learning Outcomes	Bloom's taxonomy	Relating to Program Objectives
Knowledge			

ILO1	Acquire a solid foundational knowledge of the properties of different materials and the scientific principles that impact material behavior.	4	O1
ILO2	Demonstrate an understanding of the process-structure-property relationships of materials.	4	O1
ILO3	Apply knowledge and competences to develop new materials with desired properties.	4	O2
Skills			
ILO4	Achieve proficiency in using materials synthesis and characterization techniques in laboratory	4	O3
ILO5	Analyze experimental data, using statistical tools and software to interpret results and draw meaningful conclusions about material properties.	4	O3
ILO6	Develop critical thinking and innovative problem-solving skills for supporting to work effectively in multidisciplinary teams.	4	O4
ILO7	Communicate scientific information effectively, especially using English, to a variety of audiences.	4	O4
Attitudes			

ILO8	Commit to lifelong learning to stay up-dated with the latest advancements in materials science.	4	O4
Professional responsibility			
ILO9	Understand and adhere to ethical standards in research, including issues related to data integrity, intellectual property, and the social impact of new materials.	4	O5

The following **curriculum** is presented:



No	Code	Course Name	Credit	Accumulated ECTS	ECTS*
1st Semester					
	BAA000041	General Law	3	4.5	4.5
	CHE00001	General Chemistry 1	3	5	5
	MTH00003	Integral Calculus 1B	3	4.5	4.5
	BIO00001	General Biology 1	3	4.5	4.5
	PHY00001	General Physics 1 (Mechanics - Thermodynamics)	3	4.5	4.5
	MST00010	Introduction to Materials Science	2	3	3
	BAA00011	English 1	3		5
	BAA00021	Physical education 1	2		3.5
	BAA00030	National defense - Security education	4		8
Sub-Total (excluded National defense - Security education, Physical education 1 and English)			**19**	**22.5**	**42.5**
2nd Semester					
1.	CHE00002	General Chemistry 2	3	5	5
2.	CSC00003	Basic Informatics	3	5.5	5.5
3.	BAA00101	Marxist-Leninist Philosophy	3	4.5	4.5
4.	BAA00005	General Economics	2	3	3
5.	PHY00002	General physics 2 (Electromagnetic - Optical)	3	4.5	4.5
6.	MST00005	Academic and Professional Skills	2	3	3
7.	BAA00012	English 2	3		5
8.	BAA00022	Physical Education 2	2		3.5
9.	MTH00002	Advanced Mathematics C	3	4.5	4.5
10.	ENV00001	General environment	2	3	3
11.	GEO00002	Earth Sciences	2	3	3
12.	BAA00007	Methodology of Creativity	2	3	3
13.	BAA00006	General Psychology	2	3	3
Sub-Total (excluded English 2, Physical Education			**21**	**30**	**47.5**

2; there are 2 sets of 3 elective courses)					
3rd Semester					
1.	BAA00103	Scientific Socialism	2	3	3
2.	BAA00102	Marxist-Leninist Political Economy	2	3	3
3.	MTH00040	Probability Statistics	3	4.5	4.5
4.	PHY00004	Modern Physics (Quantum - Atom - Nucleus)	3	4.5	4.5
5.	*CHE00081*	Lab work - General Chemistry	*2*	*4*	*4*
6.	*PHY00081*	Lab work - General physics	*2*	*4*	*4*
7.	*MSC00001*	Fundamental of Materials Science	*3*	*4.5*	*4.5*
8.	BAA00013	English 3	3		5
Sub-Total (excluded English 3)			**17**	**27.5**	**32.5**
4th Semester					
1.	MSC10001	Electrodynamics	2	3	3
2.	BAA00104	History of the Vietnamese Communist Party	2	3	3
3.	MSC10007	Organic Chemistry	2	3.25	3.25
4.	MSC10004	Fundamental of Solid State Science	3	4.5	4.5
5.	MSC10009	Basic biology	3	4.5	4.5
6.	MSC10020	Polymer and Composite Materials	2	3.25	3.25
7.	MSC10019	Fundamental chemistry of transition and non-transition elements	2	3.25	3.25
8.	MSC10002	Thermodynamics	3	4.5	4.5
9.	BAA00014	English 4	3		**5**
Sub-Total (excluded English 4)			**19**	**29.25**	**34.25**
5th Semester					
1.	BAA00003	Ho Chi Minh's Ideology	2	3	3

2.	MSC10010	Material Fabrication Methods 1	2	3	3
3.	MSC10011	Material Fabrication Methods 2	2	3	3
4.	MSC10015	Material Characterization Methods 1	3	4.5	4.5
5.	MSC10016	Material Characterization Methods 2	2	3.25	3.25
6.	MSC10017	Material Fabrication Methods Practice	2	4	4
7.	MSC10018	Material Characterization Methods Practice	2	4	4
8.	MSC10005	Metals, semiconductors, and insulators Materials	2	3.25	3.25
Sub-Total			**17**	**28**	**28**
6th Semester					
Polymer and Composites Materials Specialization					
1.	MSC10202	Mechanical Properties of Polymer	2	3.25	3.25
2.	MSC10203	Technology of Synthesis and Recycle of Polymers	2	3	3
3.	MSC10209	Rubber: Chemistry and Technology	2	3	3
4.	MSC10206	Polymer Blends	2	3.25	3.25
5.	MSC10211	Composite and nanocomposite materials	3	4.5	4.5
6.	MSC10219	Processing Technology of Polymers	2	3.25	3.25
7.	MSC10217	Modification of polymers	2	3	3
8.	MSC10218	Smart polymer materials and applications	2	3	3
Sub-Total			**17**	**26.25**	**26.25**
Biomedical Materials Specialization					
1.	MSC10302	Specialized Biology	2	3	3

2.	MSC10312	Tissue Technology	3	4.5	4.5
3.	MSC10307	Surface Modification of Materials	3	4.75	4.75
4.	MSC10304	Functional biomedical materials	3	4.5	4.5
5.	MSC10305	Molecular Techniques in Diagnostics	3	4.5	4.5
6.	MSC10314	Biochemical Laboratory	2	4	4
Sub-Total			**16**	**25.25**	**25.25**
Thin film Materials Specialization					
1.	MSC10107	Surface and Interface Science of Solids	2	*3.25*	*3.25*
2.	MSC10105	Thin-film Physics	3	*4.75*	*4.75*
3.	MSC10101	Chemical Defects in Materials	2	*3.25*	*3.25*
4.	MSC10108	Computational Materials	2	*3*	*3*
5.	MSC10109	Micro and Nano Electronic Engineering	3	*4.75*	*4.75*
6.	MSC10110	Surface functionalization of materials	2	*3.25*	*3.25*
7.	MSC10103	Practical Methods for Material Analysis 1	2	4	4
Sub-Total			**16**	**26.25**	**26.25**
7th Semester					
Polymer and Composites Materials Specialization					
1.	MSC10204	Polymer Testing and Characterization Methods	3	4.75	4.75
2.	MSC10221	Polymer Additives	2	3.25	3.25
3.	MSC10220	Polymer Materials in electronic and semiconductor	2	3.25	3.25
4.	MSC10208	Specialization Seminar	2	4	4
5.	MSC10202	Mechanical Polymers Laboratory	2	4	4

6.	MSC10201	Polymer Synthesis Laboratory	*2*	4	4
7.	MSC10121	Research Project	*4*	8	8
Sub-Total			**17**	**31.25**	**31.25**
Biomedical Materials Specialization					
1.	MSC10306	Biomedical engineering	3	4.5	4.5
2.	MSC10315	Biological Property Assessment of Materials	2	4	4
3.	MSC10319	Learning with Enterprises	2	3.5	3.5
4.	MSC10320	Biomedical Material Fabrication Practices	3	6	6
5.	MSC10321	Biosensors	2	3	3
6.	MSC10316	Dental Materials	2	3	3
7.	MSC10317	Cancer treatment by immunological technique	2	3	3
8.	MSC10318	Drug delivery materials	*2*	3	3
9.	MSC10121	Research project	*4*	*8*	*8*
Sub-Total			**18**	**29**	**29**
Thin film Materials Specialization					
1.	MSC10111	Materials and Devices for Energy storage	2	3	3
2.	MSC10112	Sound-thermal insulation and mechanical materials	2	3	3
3.	MSC10113	Fuel cells	2	3	3
4.	MSC10114	Gas sensor materials	2	3	3
5.	MSC10115	Photocatalytic Materials	2	3	3
6.	MSC10116	Electrical Memory Materials and Devices	2	3	3
7.	MSC10104	Materials synthesis and Characterization Laboratory 2	2	4	4
8.	MSC10118	Application of radiation technology in materials science	2	3	3

9.	MSC10119	Smart materials and applications	2	3	3
10.	MSC10120	Practice in computational materials	2	4	4
11.	MSC10121	Research project	4	8	8
Sub-Total			**16**	**24-25**	**24-25**
8th Semester					
Polymer and Composites Materials Specialization					
Option 1: Accumulate 10 credits for the graduation thesis					
1.	MSC10295	Graduation thesis	10	**20**	**20**
Sub-Total			**10**	**20**	**20**
Option 2: Accumulate 10 credits from the following courses					
1.	MST10190	Graduation Seminar	6	12	12
select 2 courses from the following courses					
2.	MSC10214	Polymer materials 1: Paints, Varnish and adhesives	3	4.5	4.5
3.	MSC10215	Polymer materials 2: Packaging and textile	2	3	3
4.	MSC10216	Functional polymers	2	3.25	3.25
5.	MSC10213	Radiation technology for modification of polymer materials	2	3	3
6.	MSC10012	Quality Management Systems (QMS)	3	4.5	4.5
Sub-Total			**10**	**18.25**	**18.25**
Biomedical Materials Specialization					
Option 1: Accumulate 10 credits for the graduation thesis					
1.	MSC10395	Graduation thesis	10	20	20
Sub-Total			**10**	**20**	**20**
Option 2: Accumulate 10 credits from the following courses					
1.	MSC10390	Graduation Seminar	4	8	8

2.	MSC10313	Biomedical Materials Engineering and Equipment	3	5	5
3.	MSC10012	Quality Management Systems (QMS)	*3*	4.5	4.5
Sub-Total			**10**	**17.5**	**17.5**
Thin films Materials Specialization					
Option 1: Accumulate 10 credits for the graduation thesis					
1.	MSC10195	Graduation thesis	10	20	20
Sub-Total			**10**	**20**	**20**
Option 2: Accumulate 10 credits from the following courses					
1.	MSC10190	Graduation Seminar	4	8	8
2.	MSC10313	Specialized seminar	3	4.5	4.5
3.	MSC10012	Quality Management Systems (QMS)	*3*	4.5	4.5
Sub-Total			**10**	**17**	**17**

Semester	Code	Course Name	Credit	Level of achievement of the LOs (according to Bloom's assessment scale)	Link between LOs and training program
1	CHE00001	General Chemistry 1	3	2	CCT1.1
	MSC00010	Introduction to Materials Science	2	2,3	CCT1.1
	ADD00031	English 1	3	2	CCT2.4
	BAA00004	General Law	3	2	CCT4.1
	BIO00001	General Biology 1	3	2	CCT1.1
	PHY00001	General Physics 1 (Mechanics - Thermodynamics)	3	2	CCT1.1
	MTH00003	Integral Calculus 1B	3	2	CCT1.1
	BAA00021	Physical education 1	2	2	

Semester	Code	Course Name	Credit	Level of achievement of the LOs (according to Bloom's assessment scale)	Link between LOs and training program
	BAA00030	National defense - Security education	4	2	
	Sub-Total (excluding National Defense and Security Education, English)		**19**		
2	BAA00101	Marxist-Leninist Philosophy	3	2	CCT4.1
	MST00005	Academic and Professional Skills	2	2.0	CCT4.1
	CSC00003	Basic Informatics	3	2	CCT2.2
	ADD00032	English 2	3	2	CCT2.4
	MTH00002	Advanced Mathematics C	3	2	CCT1.1
	CHE00002	General Chemistry 2	3	2.0	CCT1.1
	PHY00002	General physics 2 (Electricity-Magnetism)	3	2	CCT3.1
	BAA00005	General Economics	2	2	CCT4.1
	BAA00007	Methodology of Creativity	2	2	CCT2.3
	BAA00006	General Psychology	2	2	CCT2.3, CCT2.4
	GEO00002	Earth Sciences	2	2	CCT1.1
	ENV00001	General environment	2	2	CCT1.1
	BAA00022	Physical Education 2	2	2	
	Sub-total (excluding english)		**21**		
3	MSC00001	Introduction to Materials Science	3	2	CCT1.1, CCT1.2, CCT1.3, CCT2.1

Semester	Code	Course Name	Credit	Level of achievement of the LOs (according to Bloom's assessment scale)	Link between LOs and training program
	BAA00103	Scientific Socialism	2	2	CCT4.1
	BAA00102	Marxist-Leninist Political Economy	2	2.0	CCT4.1
	ADD00033	English 3	3	2	CCT2.4
	CHE00081	Lab work - General Chemistry	2	2	CCT2.1
	PHY00081	Lab work - General physics	2	2	CCT2.1
	MTH00040	Probability Statistics	3	2	CCT1.1
	PHY00004	Modern Physics (Quantum - Atom - Nucleus)	3	2	CCT1.1
	Sub-total (excluding english)		**17**		
4	ADD00034	English 4	3	2	CCT2.4
	BAA00104	History of the Vietnamese Communist Party	2	2.0	CCT4.1
	MSC10007	Organic Chemistry	2	2	CCT1.1
	MSC10001	Electrodynamics	2	2	CCT1.1
	MSC10004	Fundamental of Solid State Science	3	3	CCT1.2
	MSC10009	Basic biology	3	3	CCT1.1, CCT1.2
	MSC100xx	Fundamental chemistry of transition and non-transition elements	2	3	CCT1.1, CCT2.4, CCT3.1
	MSC10002	Thermodynamics	3	3	CCT1.1, CCT1.2, CCT2.3, CCT2.4
	MSC100xx	Polymer and composite materials	2	3	CCT1.1, CCT1.2, CCT2.2

Semester	Code	Course Name	Credit	Level of achievement of the LOs (according to Bloom's assessment scale)	Link between LOs and training program
	Sub-total (excluding english)		**19**		
5	BAA00003	Ho Chi Minh's Ideology	2	2.0	CCT4.1
	MSC10010	Material Fabrication Methods 1	2	2	CCT1.2, CCT2.3
	MSC10011	Material Fabrication Methods 2	2	3	CCT1.1, CCT1.2, CCT1.3, CCT2.1
	MSC10015	Material Characterization Methods 1	3	3	CCT1.1, CCT1.2
	MSC10016	Material Characterization Methods 2	2	3	CCT1.1, CCT1.2, CCT2.1, CCT2.2
	MSC10017	Material Fabrication Methods Practice	2	3	CCT2.1
	MSC10018	Material Characterization Methods Practice	2	3	CCT2.1
	MSC10005	Metals, semiconductors, and insulators Materials	2	3	CCT1.2
	Sub-total		**17**		
6	**Polymer and Composites Materials Specialization**				
	MSC102xx	Polymer physical properties	2	3	CCT1.1, CCT1.2, CCT2.2, CCT2.4
	MSC10203	Technology of Synthesis and Recycle of Polymers	2	3	CCT1.1, CCT1.2, CCT1.3
	MSC10209	Rubber: Chemistry and Technology	2	3	CCT1.1 CCT2.3, CCT3.1
	MSC10206	Polymer Blends	2	3	CCT1.1, CCT2.4, CCT4.1
	MSC10211	Composite and nanocomposite materials	3	3	CCT1.2, CCT2.4
	MSC10219	Processing Technology of Polymers	2	3	CCT1.1, CCT1.2, CCT1.3, CCT2.2

Semester	Code	Course Name	Credit	Level of achievement of the LOs (according to Bloom's assessment scale)	Link between LOs and training program
	MSC10217	Modification of polymers	2	3	CCT1.2, CCT1.3, CCT2.3
	MSC10218	Smart polymer materials and applications	2	3	CCT1.1, CCT1.2, CCT2.2
	Sub-Total		**17**		
	Biomedical Materials Specialization				
	MSC10302	Specialized Biology	2	3	CCT1.3
	MSC10312	Tissue Technology	3	3	CCT1.2, CCT1.3
	MSC10307	Surface Modification of Materials	3	3	CCT1.2, CCT1.3
	MSC10304	Functional biomedical materials	3	3	CCT1.1
	MSC10305	Molecular Techniques in Diagnostics	3	3	CCT4.1
	MSC10314	Biochemical Laboratory	2	3	CCT2.1
	Sub-Total		**16**		
	Thin film Materials Specialization				
	MSC10107	Surface and Interface Science of Solids	2	3	CCT1.2
	MSC10105	Thin-film Physics	3	3	CCT1.2
	MSC10101	Chemical Defects in Materials	2	3	CCT1.1, CCT1.2, CCT2.3
	MSC10108	Computational Materials	2	3	CCT1.2
	MSC10109	Micro and Nano Electronic Engineering	3	3	CCT1.1, CCT2.1, CCT3.1, CCT4.1
	MSC10110	Surface functionalization of materials	2	3	CCT1.1

Semester	Code	Course Name	Credit	Level of achievement of the LOs (according to Bloom's assessment scale)	Link between LOs and training program
	MSC10103	Practical Methods for Material Analysis 1	2	3	CCT1.1, CCT1.2, CCT2.1, CCT2.2
	Sub-Total		**16**		
7	**Polymer and Composites Materials Specialization**				
	MSC10204	Polymer Testing and Characterization Methods	3	3	CCT1.1, CCT1.2, CCT2.1
	MSC102xx	Polymer Additives	2	3	CCT1.1, CCT1.2, CCT2.2
	MSC102xx	Polymer Materials in electronic and semiconductor	2	3	CCT1.1, CCT1.2, CCT2.2
	MSC10208	Specialization Seminar	2	3	CCT1.2, CCT1.3, CCT2.3, CCT2.4
	MSC10202	Mechanical Polymers Laboratory	2	3	CCT1.2, CCT2.1, CCT2.2
	MSC10201	Polymer Synthesis Laboratory	2	3	CCT1.2, CCT2.2
	MSC10xxx	Research Project	4	3	CCT1.2, CCT1.3, CCT2.3, CCT2.4
	Sub-Total		**17**		
	Biomedical Materials Specialization				
	MSC10306	Biomedical engineering	3	3	CCT1.1, CCT1.3
	MSC10315	Biological Property Assessment of Materials	2	3	CCT1.2, CCT2.1
	MSC10319	Learning with Enterprises	2	3	CCT3.1, CCT4.1
	MSC10320	Biomedical Material Fabrication Practices	3	3	CCT1.1, CCT1.3, CCT2.1, CCT3.1
	MSC10321	Biosensors	2	3	CCT1.3
	MSC10316	Dental Materials	2	3	CCT1.3
	MSC10317	Cancer treatment by immunological technique	2	3	CCT1.2

Semester	Code	Course Name	Credit	Level of achievement of the LOs (according to Bloom's assessment scale)	Link between LOs and training program
	MSC10318	Drug delivery materials	2	3	CCT1.1, CCT1.3, CCT2.4, CCT4.1
	MSC10xxx	Research project	4	3	CCT1.2, CCT1.3, CCT2.3, CCT2.4
	Sub-Total		18		
	Thin film Materials Specialization				
	MSC10111	Materials and Devices for Energy storage	2	3	CCT1.3
	MSC10112	Sound-thermal insulation and mechanical materials	2	3	CCT1.1
	MSC10113	Fuel cells	2	3	CCT1.2
	MSC10114	Gas sensor materials	2	3	CCT1.1
	MSC10115	Photocatalytic Materials	2	3	CCT1.2
	MSC10116	Electrical Memory Materials and Devices	2	3	CCT1.2
	MSC10104	Materials synthesis and Characterization Laboratory 2	2	3	CCT2.1, CCT2.2, CCT4.1
	MSC10118	Application of radiation technology in materials science	2	3	CCT1.1, CCT3.1
	MSC10119	Smart materials and applications	2	3	CCT1.2
	MSC10120	Practice in computational materials	2	3	CCT1.1, CCT1.2, CCT1.3, CCT2.3
	MSC10xxx	Research project	4	3	CCT1.2, CCT1.3, CCT2.3, CCT2.4
	Sub-Total		16		
8	Polymer and Composites Materials Specialization				

Semester	Code	Course Name	Credit	Level of achievement of the LOs (according to Bloom's assessment scale)	Link between LOs and training program
	Option 1				
	MSC10295	Graduation thesis	10	4	CCT1.2, CCT1.3, CCT2.1, CCT2.2, CCT2.4
	Option 2: ***Students conduct Graduation Seminar and 2 graduation subjects***				
	MSC10290	Graduation Seminar	6	4	CCT1.2, CCT1.3, CCT2.1, CCT2.2, CCT2.4
	Students choose 2 out of 5 subjects				
	MSC10214	Polymer materials 1: Paints, Varnish and adhesives	3	4	CCT1.1, CCT3.1
	MSC10215	Polymer materials 2: Packaging and textile	2	4	CCT1.1, CCT2.3
	MSC10216	Functional polymers	2	4	CCT1.3
	MSC10213	Radiation technology for modification of polymer materials	2	4	CCT1.3
	MSC10012	Quality Management Systems (QMS)	3	3	CCT2.2, CCT3.1
	Biomedical Materials Specialization				
	Option 1				
	MSC10395	Graduation thesis	10	4	CCT1.2, CCT1.3, CCT2.1, CCT2.2, CCT2.4
	Option 2:				
	MSC10390	Graduation Seminar	4	4	CCT1.2, CCT1.3, CCT2.1, CCT2.2, CCT2.4
	MSC10313	Biomedical Materials Engineering and Equipment	3	4	CCT1.3
	MSC10012	Quality Management Systems (QMS)	3	3	CCT2.2, CCT3.1

Semester	Code	Course Name	Credit	Level of achievement of the LOs (according to Bloom's assessment scale)	Link between LOs and training program
	Sub-Total		**10**		
	Thin film Materials Specialization				
	Option 1				
	MSC10195	Graduation thesis	10	4	CCT1.2, CCT1.3, CCT2.1, CCT2.2, CCT2.4
	Option 2				
	MSC10190	Graduation Seminar	4	4	CCT1.2, CCT1.3, CCT2.1, CCT2.2, CCT2.4
	MSC10117	Specialized seminar	3	4	CCT1.1, CCT2.1
	MSC10012	Quality Management Systems (QMS)	3	3	
	Sub-Total		**10**		

The following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved by the Ba Material Science programme (BaMS):

General objectives

STT	Goals (MT or G)	Goal Met
KNOWLEDGE		
1	MT1.1	Apply knowledge of mathematics, physics, chemistry, computer science, and basic social sciences while gaining a deep understanding of the principles governing the properties and applications of materials.
2	MT1.2	Apply theoretical knowledge and research skills to develop materials with specific properties based on scientific principles.
SKILLS		
3	MT2.1	Ability to work in a team and have the skills to perform scientific work independently when doing assignments as well as presenting and discussing the results of the work.
ATTITUDES		
4	MT3.1	Develop the skills and mindsets necessary for lifelong learning, including the ability to evaluate new information, adapt to evolving technological and professional landscapes, and actively seek opportunities for ongoing personal and professional development.
PROFESSIONAL RESPONSIBILITY		
5	MT4.1	Commit to act in accordance with professional ethics, responsibilities and workplace regulations.

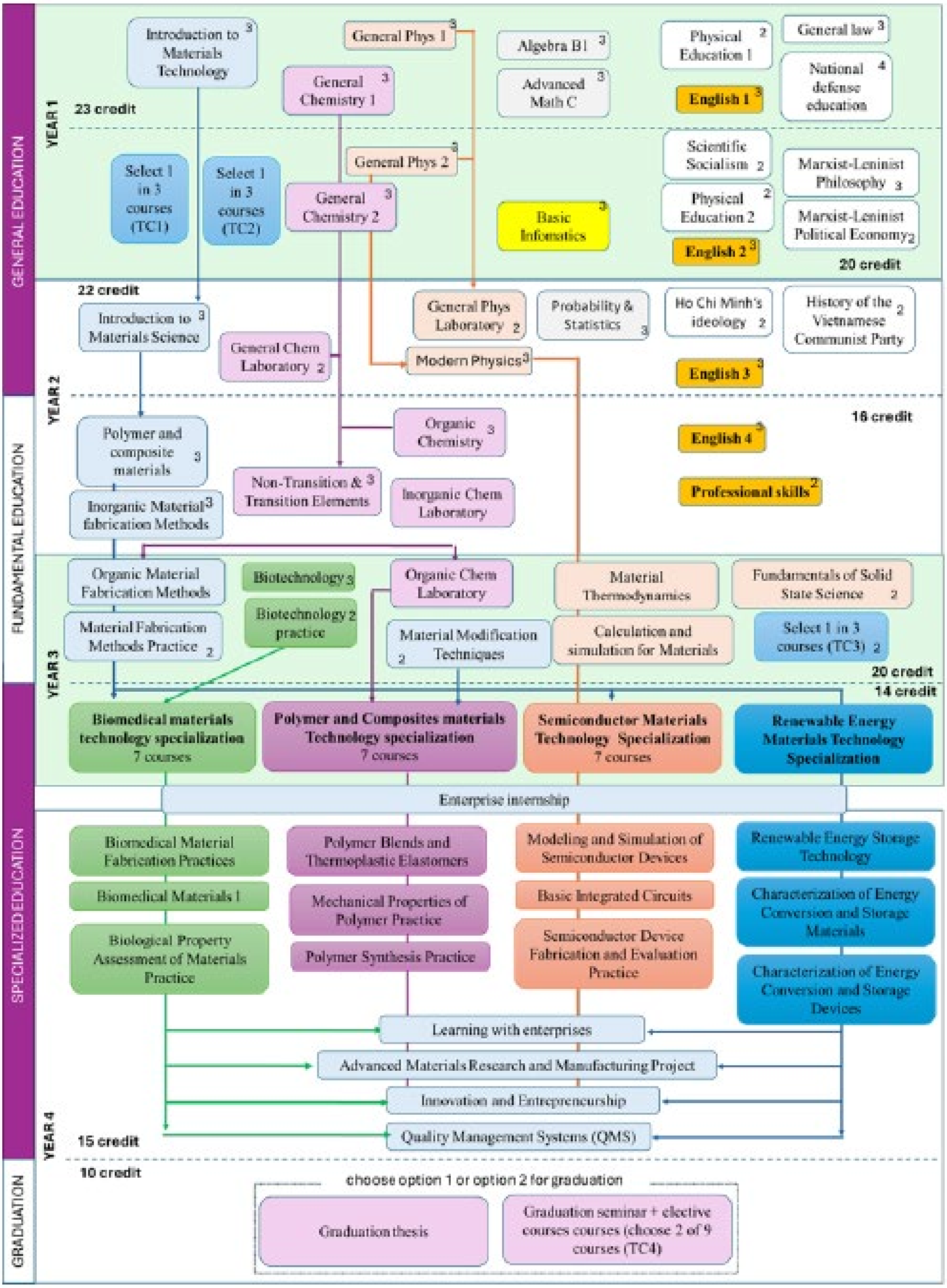
Intended Learning Outcomes

Labels	Learning Outcomes	Bloom's taxonomy	Relating to Program Objectives
Knowledge			
ILO1	Acquire a solid foundational knowledge of the properties of different materials and the	4	O1

	scientific principles that impact material behavior.		
ILO2	Demonstrate an understanding of the performance-process-structure relationships of materials.	4	O1
ILO3	Apply knowledge and competences to optimize the process that manufactures products with specific performance criteria.	4	O2
Skills			
ILO4	Achieve proficiency in using materials synthesis and characterization techniques to solve practical engineering problems, particularly in product design, materials optimization, and manufacturing considering performance criteria, cost, and sustainability considerations.	4	O3
ILO5	Utilize and interpret data from materials databases to make informed decisions about material selection and processing.	4	O3
ILO6	Develop critical thinking and innovative problem-solving skills to work effectively in multidisciplinary teams.	4	O4
ILO7	Communicate technical information effectively, especially using English, to a variety of audiences.	4	O4
Attitudes			

ILO8	Commit to lifelong learning and stay updated with the latest advancements in materials technologies and processes.	4	O4
Professional responsibility			
ILO9	Uphold professional ethics and social responsibility, emphasizing the impact of materials science on society and the environment.	4	O5

The following **curriculum** is presented:



No	Code	Course Name	Credit	Accumulated ECTS	ECTS*
		1st Semester			
1.	BAA000041	General Law	3	4.5	4.5
	CHE00001	General Chemistry 1	3	5	5
1.	MTH00003	Integral Calculus 1B	3	4.5	4.5
2.	MTH00002	Advanced Mathematics C	3	4.5	4.5
3.	PHY00001	General Physics 1 (Mechanics - Thermodynamics)	3	4.5	4.5
4.	MST00002	Introduction to Materials Technology	3	5.5	5.5
5.	BAA00011	English 1	3		5
6.	BAA00021	Physical education 1	2		3.5
7.	BAA00030	National defense - Security education	4		8
Sub-Total (excluded National defense - Security education, Physical Education 1 and English 1)			**23**	**28.5**	**45**
2nd Semester					
1.	CHE00002	General Chemistry 2	3	5	5
2.	CSC00003	Basic Informatics	3	4.5	4.5
3.	BAA00101	Marxist-Leninist Philosophy	3	4.5	4.5
4.	BAA00005	General Economics	2	4.5	4.5
5.	PHY00002	General physics 2 (Electricity-Magnetism)	3	4.5	4.5
6.	BAA00103	Scientific Socialism	2	4.5	4.5
7.	BAA00102	Marxist-Leninist Political Economy	2	4	4
8.	BAA00012	English 2	3		5
9.	BAA00022	Physical Education 2	2		3.5
10.	MST00001	Laboratory Safety	2	3	3
11.	ENV00001	General environment	2	3	3
12.	GEO000002	Earth Sciences	2	3	3
13.	BAA00007	Methodology of Creativity	2	3	3

14.	BAA00006	General Psychology	2	3	3
Sub-Total (excluded English 2, Physical Education 2)			**20**	**34.5**	**46**
3rd Semester					
1.	BAA00003	Ho Chi Minh's Ideology	2	3	3
2.	BAA00104	History of the Vietnamese Communist Party	2	3	3
3.	MTH00040	Probability Statistics	3	4.5	4.5
4.	PHY00004	Modern Physics (Quantum - Atom - Nucleus)	3	4.5	4.5
5.	CHE0081	Lab work - General Chemistry	2	4	4
6.	PHY00081	Lab work - General physics	2	4	4
7.	MSC00001	Introduction to Materials Science	3	4.5	4.5
8.	BAA00013	English 3	3		5
Sub-Total (excluded English 3)			**17**	**27.5**	**32.5**
4th Semester					
1.	MSC10007	Organic Chemistry	3	5	5
2.	MST10009	Polymer and Composite Materials	3	4.5	4.5
3.	MSC10006	Transition and Non-Transition Elements	3	4.5	4.5
4.	MST10003	Inorganic Material Fabrication Methods	3	5	5
5.	MST10002	Inorganic Chemistry Practice	2	4	4
6.	MST10011	Professional Skills	2	3.25	3.25
7.	BAA00014	English 4	3		5
Sub-Total (excluded English 4)			**16**	**26.25**	**31.25**
5th Semester					
1.	MST10001	Organic Chemistry Practice	2	4	4
2.	MST10016	Organic Material Fabrication Methods	2	3.25	3.25
3.	MST10019	Biotechnology Practice	2	4	4
4.	MST10021	Biotechnology	2	3	3

5.	MST10005	Material Fabrication Methods Practice	2	4	4
6.	MST10020	Material Modification Techniques	2	3	3
7.	MST10023	Material Thermodynamics	2	3	3
8.	MST10015	Calculation and Simulation for Materials	2	3.5	3.5
9.	MST10025	Ceramic Materials	2	3	3
10.	MST10024	Metal and Alloy Materials	2	3	3
11.	MST10026	Semiconductor Materials	2	3	3
12.	MST10022	Fundamentals of Solid State Science	2	3	3
Sub-Total (there are 1 set of 3 elective courses)			**20**	**33.75**	**33.75**
6th Semester					
Polymer and Composites Materials Technology Specialization					
1.	MST10018	Material Property Analysis Methods	2	3	3
2.	MST10008	Material Analysis Methods Practice	2	4	4
3.	MST10017	Structural and Morphological Analysis Methods	2	3.25	3.25
4.	MST10101	Mechanical Properties of Polymers	2	3	3
5.	MST10138	Polymer characterization methods	2	*3.25*	*3.25*
6.	MSC10219	Polymer Processing Technology	2	*3*	*3*
7.	MST10139	Polymer Additives and Polymer-Modified	2	*3*	*3*
Sub-Total			**14**	**22.5**	**22.5**
Biomedical Materials Technology Specialization					
1.	MST10018	Methods for Analyzing Material Properties	2	3	3
2.	MST10008	Practical Methods for Material	*2*	4	4

		Analysis			
3.	MST10017	Methods for Analyzing Material Structure and Morphology	2	3.25	3.25
4.	MST10201	Biomedical Materials 1	2	3.25	3.25
5.	MST10205	Biomedical Sensors and Evaluation Techniques	2	3	3
6.	MST10206	Tissue Engineering	2	3	3
7.	MST10204	Techniques for evaluating the biological properties of materials	2	3	3
Sub-Total			**14**	**22.5**	**22.5**
Semiconductor Materials Technology Specialization					
1.	MST10018	Methods for Analyzing Material Properties	2	3	3
2.	MST10008	Practical Methods for Material Analysis	2	4	4
3.	MST10017	Methods for Analyzing Material Structure and Morphology	2	3.25	3.25
4.	MST10301	Semiconductor Packaging Technology	2	3.25	3.25
5.	MST10302	Semiconductor Devices	2	3.25	3.25
6.	MST10303	Optoelectronic Devices	2	3	3
7.	MST10304	Microelectromechanical Systems (MEMS) Technology	2	3	3
Sub-Total			**14**	**22.75**	**22.75**
Renewable Energy Materials Technology Specialization					
1.	MST10018	Methods for Analyzing Material Properties	2	3	3
2.	MST10008	Practical Methods for Material Analysis	2	4	4
3.	MST10017	Methods for Analyzing Material Structure and Morphology	2	3.25	3.25
4.	MST10401	Renewable Energy Systems and Their Impact on Economic and	2	3.25	3.25

		Environmental			
5.	MST10402	Energy Harvesting and Conversion Materials	2	3	3
6.	MST10403	Energy Storage Materials	2	3	3
7.	MST10404	Renewable Energy Harvesting and Conversion Technology	2	3.25	3.25
Sub-Total			**14**	**22.75**	**22.75**
Summer Semester					
1.	MST10112	Enterprise Internship	*3*	**6**	**6**
7th Semester					
Polymer and Composites Materials Technology Specialization					
1.	MST10140	Polymer Blends and Thermoplastic Elastomers	2	3	3
2.	MSC10202	Mechanical Properties of Polymer Internship	2	4	4
3.	MSC10201	Polymer Synthesis Internship	2	4	4
4.	MST10129	Learning with Enterprises	2	3	3
5.	MST10136	Advanced Materials Research and Manufacturing Project	2	4	4
6.	MSC10012	Quality Management Systems (QMS)	3	4.5	4.5
7.	MST10137	Innovation and Entrepreneurship	2	3	3
Sub-Total			**15**	**25.5**	**25.5**
Biomedical Materials Technology Specialization					
1.	MST10203	Biomedical Material Fabrication Practices	2	3	3
2.	MSC10315	Biological Property Assessment of Materials Internship	2	4	4
3.	MST10202	Biomedical Materials 1	2	3.25	3.25
4.	MST10129	Learning with Enterprises	2	3	3
5.	MST10136	Advanced Materials Research and Manufacturing Project	2	4	4

6.	MST10137	Innovation and Entrepreneurship	2	3	3
7.	MSC10012	Quality Management Systems (QMS)	3	4.5	4.5
Sub-Total			**15**	**24.75**	**24.75**
Semiconductor Materials Technology Specialization					
1.	MST10305	Semiconductor Device Fabrication and Evaluation Internship	2	4	4
2.	MST10306	Modeling and Simulation of Semiconductor Devices	2	4	4
3.	MST10307	Basic Integrated Circuits	2	3	3
4.	MST10129	Learning with Enterprises	2	3	3
5.	MST10136	Advanced Materials Research and Manufacturing Project	2	4	4
6.	MST10137	Innovation and Entrepreneurship	2	3	3
7.	MSC10012	Quality Management Systems (QMS)	3	4.5	4.5
Sub-Total			**15**	**25.5**	**25.5**
Renewable Energy Materials Technology Specialization					
1.	MST10405	Renewable Energy Storage Technology	*2*	3	3
2.	MST10406	Characterization of Energy Conversion and Storage Materials	2	4	4
3.	MST10407	Characterization of Energy Conversion and Storage Devices	2	4	4
4.	MST10129	Learning with Enterprises	2	3	3
5.	MST10136	Advanced Materials Research and Manufacturing Project	2	4	4
6.	MST10137	Innovation and Entrepreneurship	2	3	3

7.	MSC10012	Quality Management Systems (QMS)	3	4.5	4.5
Sub-Total			**15**	**25.5**	**25.5**
8th Semester					
Option 1: Accumulate 10 credits for the graduation thesis					
1.	MST10995	Graduation thesis	10	20	20
Sub-Total			**10**	**20**	**20**
Option 2: Accumulate 10 credits from the following courses					
1.	MST10990	Graduation Seminar	6	12	12
2.	MST10171	Smart Materials and Applications	2	3	3
3.	MST10172	Packaging Materials Technology	2	3	3
5	MST10121	Painting Materials and Varnish Technology	2	3	3
6	MST10173	New Materials Technology in Construction	2	3	3
7	MST10174	Nanotechnology and Nanomaterials	2	3	3
8	MST10175	Sensor Technology and Applications	2	3	3
9	MST10176	Machine Learning and AI in Materials Science	2	3	3
10	MST10177	Flexible Devices	2	3	3
11	MST10178	Recycling Materials Technology	2	3	3
Sub-Total			**10**	**18**	**18**

Semester	Code	Course Name	Credit	Level of achievement of the LOs (according to Bloom's assessment scale)	Link between LOs and training program
1	BAA00004	General Law	3	2.0	CCT4.1
	ADD00031	English 1	3	2.0	CCT2.4
	BAA00021	Physical education 1	2	2.0	
	BAA00030	National defense - Security education	4	2.0	
	MTH00003	Integral Calculus 1B	3	2.0	CCT1.1

Semester	Code	Course Name	Credit	Level of achievement of the LOs (according to Bloom's assessment scale)	Link between LOs and training program
	MTH00002	Advanced Mathematics C	3	2.0	CCT1.1
	CHE00001	General Chemistry 1	3	2.0	CCT1.1
	CHE00002	General Chemistry 2	3	2.0	CCT1.1
	PHY00001	General Physics 1 (Mechanics - Thermodynamics)	3	2.0	CCT3.1
	MST00002	Introduction to Materials Technology	3	2.0	CCT1.1, CCT1.2, CCT1.3, CCT2.2
	Sub-Total (excluding National Defense and Security Education, English))		**23**		
2	BAA00101	Marxist-Leninist Philosophy	3	2.0	CCT4.1
	BAA00102	Marxist-Leninist Political Economy	2	2.0	CCT4.1
	BAA00103	Scientific Socialism	2	2.0	CCT4.1
	BAA00005	General Economics	2	2.0	CCT4.1
	BAA00006	General Psychology	2	2.0	CCT2.3, CCT2.4
	BAA00007	Methodology of Creativity	2	2.0	CCT2.3
	GEO00002	Earth Sciences	2	2.0	CCT1.1
	ENV00001	General environment	2	2.0	CCT1.1
	MST00001	Laboratory Safety	2	2.0	CCT1.3
	ADD00032	English 2	3	2.0	CCT2.4
	BAA00022	Physical education 2	2	2.0	
	CSC00003	Basic Informatics	3	2.0	CCT2.4
	PHY00002	General physics 2 (Electromagnetic - Optical)	3	2.0	CCT3.1
	Sub-Total (excluding english)		**20**		
3	BAA00104	History of the Vietnamese Communist Party	2	2.0	CCT4.1
	BAA00003	Ho Chi Minh's Ideology	2	2.0	CCT4.1
	ADD00033	English 3	3	2.0	CCT2.4
	MTH00040	Probability Statistics	3	2.0	CCT1.1

Semester	Code	Course Name	Credit	Level of achievement of the LOs (according to Bloom's assessment scale)	Link between LOs and training program
	CHE00081	Lab work - General Chemistry	2	2.0	CT2.1
	PHY00081	Lab work - General physics	2	2.0	CCT2.1
	PHY00004	Modern Physics (Quantum - Atom - Nucleus)	3	2.0	CCT2.3
	MSC00001	Fundamental of Materials Science	3	2.0	CCT1.1, CCT1.2, CCT1.3, CCT2.1
	Sub-Total (excluding english)		19		
4	ADD00034	English 4	3	2.0	CCT2.4
	MSC10007	Organic Chemistry	3	2.0	CCT1.1
	MST10009	Polymer and Composite Materials	3	3.0	CCT1.1, CCT1.2, CCT2.2
	MSC10006	Transition and Non-Transition Elements	3	3.0	CCT1.2, CCT1.3, CCT3.1
	MST10003	Inorganic Material Fabrication Methods	3	3.0	CCT1.2, CCT2.2, CCT2.4
	MST10002	Inorganic Chemistry Practice	2	3.0	CCT1.2, CCT1.3
	MST10011	Professional Skills	2	3.0	CCT2.3, CCT4.1
	Sub-Total (excluding english)		16		
5	MST10001	Organic Chemistry Practice	2	3.0	CCT1.1, CCT1.2
	MST10016	Organic Material Fabrication Methods	2	3.0	CCT1.2, CCT2.3
	MST10019	Biotechnology Practice	2	3.0	CCT1.3
	MST10021	Biotechnology	2	3.0	CCT1.3
	MST10005	Material Fabrication Methods Practice	2	3.0	CCT1.2, CCT1.3
	MST10020	Material Modification Techniques	2	3.0	CCT1.3
	MST10023	Material Thermodynamics	2	3.0	CCT1.3
	MST10015	Calculation and Simulation for Materials	2	3.0	CCT1.2, CCT1.3, CCT2.2, CCT2.3
	MST10025	Ceramic Materials	2	3.0	CCT1.2

Semester	Code	Course Name	Credit	Level of achievement of the LOs (according to Bloom's assessment scale)	Link between LOs and training program
	MST10024	Metal and Alloy Materials	2	3.0	CCT1.2
	MST10026	Semiconductor Materials	2	3.0	CCT1.2
	MST10022	Fundamentals of Solid State Science	2	3.0	CCT1.2
	Sub-Total		**20**		
6	**Polymer & Composite Materials Technology Specialization**				
	MST10018	Các phương pháp phân tích tính chất của vật liệu	2	3.0	CCT1.3
	MST10008	Thực hành các phương pháp phân tích vật liệu	2	3.0	CCT2.1
	MST10017	Các phương pháp phân tích cấu trúc và hình thái vật liệu	2	3.0	CCT1.1, CCT2.1, CCT2.2, CCT2.4
	MST10101	Mechanical Properties of Polymers	2	3.0	CCT1.2, CCT1.3, CCT2.1, CCT2.2
	MST10138	Polymer characterization methods	2	3.0	CCT1.1, CCT1.2, CCT2.2
	MSC10219	Processing Technology of Polymers	2	3.0	CCT1.2, CCT1.3, CCT2.1, CCT2.2
	MST10139	Polymer Additives and Polymer-Modified	2	3.0	CCT1.1, CCT1.2, CCT2.2
	Sub-Total		**14**		
	Biomedical Materials Technology Specialization				
	MST10018	Material Property Analysis Methods	2	3.0	CCT1.3
	MST10008	Material Analysis Methods Practice	2	3.0	CCT2.1
	MST10017	Structural and Morphological Analysis Methods	2	3.0	CCT1.1, CCT2.1, CCT2.2, CCT2.4
	MST10201	Biomedical Materials 1	2	3.0	CCT1.3
	MST10205	Biomedical Sensors and Evaluation Techniques	2	3.0	CCT1.3
	MST10206	Tissue Engineering	2	3.0	CCT1.3

Semester	Code	Course Name	Credit	Level of achievement of the LOs (according to Bloom's assessment scale)	Link between LOs and training program
	MST10204	Techniques for evaluating the biological properties of materials	2	3.0	CCT1.1
	Sub-Total		**14**		
	Semiconductor Materials Technology Specialization				
	MST10018	Material Property Analysis Methods	2	3.0	CCT1.3
	MST10008	Material Analysis Methods Practice	2	3.0	CCT2.1
	MST10017	Structural and Morphological Analysis Methods	2	3.0	CCT1.1, CCT2.1, CCT2.2, CCT2.4
	MST10301	Semiconductor Packaging Technology	2	3.0	CCT1.1, CCT2.1, CCT3.1, CCT4.1
	MST10302	Semiconductor Devices	2	3.0	CCT1.1, CCT2.3, CCT3.1, CCT4.1
	MST10303	Optoelectronic Devices	2	3.0	CCT1.3
	MST10304	Microelectromechanical Systems (MEMS) Technology	2	3.0	CCT1.1, CCT1.2, CCT2.3, CCT4.1
	Sub-Total		**14**		
	Renewable Energy Materials Technology Specialization				
	MST10018	Methods for Analyzing Material Properties	2	3.0	CCT1.3
	MST10008	Practical Methods for Material Analysis	2	3.0	CCT2.1
	MST10017	Methods for Analyzing Material Structure and Morphology	2	3.0	CCT1.1, CCT2.1, CCT2.2, CCT2.4
	MST10401	Renewable Energy Systems and Their Impact on Economic and Environmental	2	3.0	CCT1.3
	MST10402	Energy Harvesting and Conversion Materials	2	3.0	CCT1.1
	MST10403	Energy Storage Materials	2	3.0	CCT1.1, CCT1.2, CCT2.2, CCT2.4

Semester	Code	Course Name	Credit	Level of achievement of the LOs (according to Bloom's assessment scale)	Link between LOs and training program
	MST10404	Microelectromechanical Systems (MEMS) Technology	2	3.0	CCT1.2
	Sub-Total		**14**		
7	**Polymer and Composite Materials Technology, Biomedical Materials Technology, Semiconductor Materials Technology, Renewable Energy Materials Technology**				
	MST10112	Enterprise Internship	3	3.0	CCT3.1, CCT4.1
	Sub-Total		**3**		
8	**Polymer & Composite Materials Technology Specialization**				
	MST10140	Polymer Blends and Thermoplastic Elastomers	2	3.0	CCT1.2, CCT2.2, CCT2.4
	MSC10202	Mechanical Properties of Polymer	2	3.0	CCT1.1, CCT2.1, CCT2.2
	MSC10201	Polymer Synthesis Internship	2	3.0	CCT1.2, CCT2.2, CCT4.1
	MST10129	Learning with Enterprises	2	3.0	CCT4.1
	MST10136	Advanced Materials Research and Manufacturing Project	2	3.0	CCT2.1, CCT2.2, CCT4.1
	MST10137	Innovation and Entrepreneurship	2	3.0	CCT2.2
	MSC10012	Quality Management Systems (QMS)	3	3.0	CCT1.3, CCT3.1
	Sub-Total		**15**		
	Biomedical Materials Technology Specialization				
	MST10203	Biomedical Material Fabrication Practices	2	3.0	CCT1.1, CCT1.3, CCT2.1, CCT3.1
	MSC10315	Biological Property Assessment of Materials Internship	2	3.0	CCT1.1

Semester	Code	Course Name	Credit	Level of achievement of the LOs (according to Bloom's assessment scale)	Link between LOs and training program
	MST10202	Biomedical Materials 2	2	3.0	CCT1.1, CCT1.2
	MST10129	Learning with Enterprises	2	3.0	CCT4.1
	MST10136	Advanced Materials Research and Manufacturing Project	2	3.0	CCT2.1, CCT2.2, CCT4.1
	MST10137	Innovation and Entrepreneurship	2	3.0	CCT2.2
	MSC10012	Quality Management Systems (QMS)	3	3.0	CCT1.3, CCT3.1
	Sub-Total		15		
	Semiconductor Materials Technology Specialization				
	MST10305	Semiconductor Device Fabrication and Evaluation Internship	2	3.0	CCT2.1
	MST10306	Modeling and Simulation of Semiconductor Devices	2	3.0	CCT1.1, CCT1.2, CCT2.1, CCT2.2
	MST10307	Basic Integrated Circuits	2	3.0	CCT1.3
	MST10129	Learning with Enterprises	2	3.0	CCT4.1
	MST10136	Advanced Materials Research and Manufacturing Project	2	3.0	CCT2.1, CCT2.2, CCT4.1
	MST10137	Innovation and Entrepreneurship	2	3.0	CCT2.2
	MSC10012	Quality Management Systems (QMS)	3	3.0	CCT1.3, CCT3.1
	Sub-Total		15		
	Renewable Energy Materials Technology Specialization				
	MST10405	Renewable Energy Storage Technology	2		CCT1.1, CCT1.2, CCT2.2, CCT2.3
	MST10406	Characterization of Energy Conversion and Storage Materials	2	3.0	CCT2.1

Semester	Code	Course Name	Credit	Level of achievement of the LOs (according to Bloom's assessment scale)	Link between LOs and training program
	MST10407	Characterization of Energy Conversion and Storage Devices	2	3.0	CCT2.3
	MST10129	Learning with Enterprises	2	3.0	CCT4.1
	MST10136	Advanced Materials Research and Manufacturing Project	2	3.0	CCT2.1, CCT2.2, CCT4.1
	MST10137	Innovation and Entrepreneurship	2	3.0	CCT2.2
	MSC10012	Quality Management Systems (QMS)	3	3.0	CCT1.3, CCT3.1
	Sub-Total		**15**		
9	**Option 1**				
	MST10995	Graduation thesis	10	3.0	CCT1.2, CCT1.3, CCT2.1, CCT2.2, CCT2.4
	Option 2				
	MST10990	Graduation Seminar	6	3.0	CCT1.2, CCT1.3, CCT2.1, CCT2.2, CCT2.4
	MST10171	Smart Materials and Applications	2	3.0	CCT1.1, CCT1.2, CCT2.2
	MST10172	Packaging Materials Technology	2	3.0	CCT1.1, CCT2.3
	MST10121	Painting Materials and Varnish Technology	2	3.0	CCT1.1, CCT2.3
	MST10173	New Materials Technology in Construction	2	3.0	CCT1.3
	MST10174	Nanotechnology and Nanomaterials	2	3.0	CCT1.3

Semester	Code	Course Name	Credit	Level of achievement of the LOs (according to Bloom's assessment scale)	Link between LOs and training program
	MST10175	Sensor Technology and Applications	2	3.0	CCT1.1
	MST10176	Machine Learning and AI in Materials Science	2	3.0	CCT1.2, CCT1.3, CCT2.2, CCT2.3
	MST10177	Flexible Devices	2		CCT1.1, CCT1.2, CCT2.3, CCT4.1
	MST10178	Recycling Materials Technology	2		CCT1.1, CCT2.1, CCT4.1
	Sub-Total		**10**		