ASIIN Seal & European Labels

Accreditation Report

Bachelor Degree Programme
Electrical and Computer Engineering

Master Degree Programmes
Mechatronics and Sensor Systems Technology
Computational Engineering

Provided by
Vietnamese-German University

Version: 03 December 2020

Table of Content

A About the Accreditation Process

Name of the degree programme (in original language)	**(Official) English translation of the name** (at the same time official study name)	**Labels applied for** [1]	**Previous accreditation (issuing agency, validity)**	**Involved Technical Committees (TC)**[2]
Kỹ thuật Điện và Máy tính	Electrical and Computer Engineering	ASIIN	–	02
Thạc sỹ Cơ điện tử và công nghệ cảm biến	Mechatronics and Sensor Systems Technology	ASIIN	–	02
Tính toán kỹ thuật và mô phỏng trên máy tính	Computational Engineering	ASIIN	–	02
Date of the contract: 01.03.2019 **Submission of the final version of the self-assessment report:** 30.09.2019 **Date of the onsite visit:** 31.10./01.11.2019 **at:** Binh Duong campus, Thu Dau Mot City, Binh Duong Province, Vietnam				
Peer panel: Dipl.-Inform. Ernst Blank, Siemens AG; Prof. Dr. Madhu Chandra, Technical University of Chemnitz; Prof. Christoph Rappl, Technical University of Applied Sciences Deggendorf No student peer available at request.				
Representative of the ASIIN headquarter: Dr. Siegfried Hermes				
Responsible decision-making committee: Accreditation Commission for Degree Programmes				

[1] ASIIN Seal for degree programmes

[2] TC: Technical Committee for the following subject areas: TC 02 - Electrical Engineering/Information Technology

Criteria used:

European Standards and Guidelines as of 15.05.2015

ASIIN General Criteria, as of 10.12.2015

Subject-Specific Criteria of Technical Committee 02 – Electrical Engineering and Information Technology as of 09.12.2011

B Characteristics of the Degree Programmes

a) Name	Final degree (original/English translation)	b) Areas of Specialization	c) Corresponding level of the EQF[3]	d) Mode of Study	e) Double/Joint Degree	f) Duration	g) Credit points/ unit	h) Intake rhythm & First time of offer
Electrical and Computer Engineering	Bachelor of Engineering	- Automation Technology - Energy Technology - Information & Communications Technology	6	Full time	In cooperation with Frankfurt UAS	8 Semester (1 Foundation semester + 7 Program semesters)	240 ECTS	WS WS 2008/09
Mechatronics and Sensor Systems Technology	Master of Science	–	7	Full time	In cooperation with Hochschule Karlsruhe	4 Semester	120 ECTS	WS WS 2010/11
Computational Engineering	Master of Science	–	7	Full time	In cooperation with Ruhr-Universität Bochum	4	120 ECTS	WS WS 2009/10

For the Bachelor degree programme Electrical and Computer Engineering the institution has presented the following profile in the self-assessment report:

„1. The graduates become practicing engineers in fields such as design, research, development, testing, manufacturing, operations and service systems. They may pursue a diverse range of positions such as engineers, consultants, planning officers, entrepreneurs in public, private institutions and start-up companies.

2. Engineering ethos: The graduates have the laboratory skills and the ability to use modern analysis, design techniques and state-of-the-art equipment to solve practical engineering problems. Through project-oriented tasks in dealing with practical and job-related examples, graduates apply their knowledge, recognize their knowledge gaps and are able to close them according to specific requirements.

3. Professional skills and leadership: The graduates have the professional skills to function effectively in the work environment as well as in the community. The impact of ECE gradu-

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

ates is measured not only by their individual technical innovations, but also by their influence on their teams and companies, and in their fields. Graduates are prepared to conduct effective project and/or executive management.

4. Engagement: the graduates have a solid understanding of professional and ethical responsibility, committed to ethical action and engaged in life-long learning to remain effective members of their communities and thoughtful contributors to society, economy and ecology.

5. Versatility: The graduates apply their abilities, talents, and insights creatively and productively in fields and professions. They acquire social skills and engineering expertise according to German standards in order to adapt and work effectively in the multi-disciplinary, Vietnamese and international work environments.

6. Constant development: The graduates have the ability to engage in life-long learning and recognize that the practice of electrical engineering is constantly evolving and that engineers must have the ability to acquire new knowledge and skills on their own. "

For the Master degree programme Mechatronic and Sensor Systems Technology the institution has presented the following profile in the self-assessment report:

C	KEY COMPETENCES ACHIEVED ON PROGRAMME COMPLETION	
1	MAIN GENERIC COMPETENCES	• An engineering and scientific ethos. The graduates have the laboratory skills, the state-of-the-art technologies and methodologies in order to model and solve technical issues relating to sensor systems technology. • Analytical and critical thinking skills. • The ability to perform tasks in a professional manner in industry and research.
2	MAIN SUBJECT SPECIFIC COMPETENCES	• Courses rated using European Credit Transfer and Accumulation System (ECTS). The program with 120 credits. • Offers therefore lectures on fundamental knowledge about the physical and manufacturing aspects of sensor technology. • The signal processing and the application of sensors build up the basis of the program. • Intensively deals with sensor-based monitoring and environmental technology

D	EMPLOYABILITY & FURTHER EDUCATION	
1	EMPLOYABILITY	With a strong in-depth background and broad knowledge in sensor science, mechanics, control systems, software engineering and essential soft-skills acquired, graduates of the MSST can hold managerial positions in prestige technology engineering firms and/or research institutes. Specifically, they have the necessary ability to work in the field, e.g.: • Sensor systems • Automation and control engineering • Robotics engineering • Automotive design and manufacture • Environmental and Water resources engineering • Chemical and Pharmaceutical engineering • Petroleum and Geological engineering.

For the Master degree programme Computational Engineering the institution has presented the following profile in the self-assessment report:

„The goal of the Master's Program in Computational Engineering is to impart to students all the necessary knowledge—basic or advanced—of methods, algorithms, and software in the field of Computational Engineering. Computational Engineering graduates, with interdisciplinary expertise, are fully qualified to work either independently or collaboratively to complete modern complex engineering tasks. The program thus naturally leads to professional qualifications that are required for R&D work in either national or international high-tech industry. Our graduates also possess the necessary knowledge and skills to advance to doctoral training programs."

C Peer 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:

- Relevant chapter of the relevant SAR
- Art. 2 para 2 (ECE), Art. 2 para 3 (CompE), Art. 2 para 2 (MST) of the relevant Specific Examination Regulation, Appendices B2 (ECE), 8 (CompE) and B1 (MST) of the respective SAR
- Module Handbook, Appendices A2 (ECE), 9 (CompENG), A3 (MST) of the respective SARs
- Curriculum Mapping, table in the Module Handbook, Appendices A2 (ECE), 9 (CompENG), A3 (MST) of the respective SARs
- Program Review Report, Appendix 5 of the Computational Engineering SAR
- Audit discussions

Preliminary assessment and analysis of the peers:
The Faculty of Engineering of Vietnamese-German University (VGU) has deliberatively defined study and learning objectives for each of the degree programmes under review. These learning outcomes are included into the degree-specific study and examination regulations and in the respective module handbooks as well. In addition, it is expected that they will be accessible on the internet as soon as the revised degree programmes have been introduced during intake 2020/21.

Learning outcomes and contents of the different degree programmes have been carefully revised in the transition process leading up to the onsite visit in October/November 2019. The peer panel positively notes that the main stakeholders of the programmes (namely lecturers, students, alumni, employers from industry) have been interrogated in this review process and their response thoroughly considered for the revision of the programme study and learning objectives as well as for updating the respective curricula.

The peers notice that only in the case of the Bachelor Electrical and Computer Engineering the degree programmes under review could easily be attributed to one of ASIIN's Technical Committees, in this case the Technical Committee – Electrical Engineering and Information Technology. Regarding their curricular design, the Mechatronics and Sensor Systems programme as well as the Computational Engineering programme reveal a more or less outspoken interdisciplinary nature hardly to be ascribed to any specific Technical Committee. Both of them are rather relating to different Technical Committees. Thus, a merger of different sets of so-called Subject-Specific Criteria (SSC) relevant for the degree programmes of the related Technical Committees at once is applying.[4] Consequently, the Faculty waived the option of presenting a module-objectives matrix for each programme along the lines of the SSC of one Technical Committee and decided to provide tables matching the self-defined learning objectives with the module content supposed to be conveying related knowledge, skills and competences ("Curriculum mapping"). In the peers' opinion, the Faculty of Engineering presents good evidence for this.

The common ground of all degree programmes under consideration is that they are offerings of the Faculty of Engineering, each of them related to certain engineering areas and economic branches. Thus, all graduates of the programmes have to acquire knowledge and skills in certain competence fields considered to be at the core of the Engineering profession. These were major competence areas such as Engineering Fundamentals, Engineering Analysis, Engineering Design, Engineering Practice and important transferable skills. Looking at the learning objectives and module/course contents of the degree programmes, the peers do not doubt that they overall reflect competence levels equivalent to EQF level 6 (Bachelor) and 7 (Master) respectively.[5]

As to the core engineering competence fields, the list of intended learning outcomes of the Bachelor programme Electrical and Computer Engineering presents with ILO1 and ILO3[6] learning objectives practically covering all major Engineering competence fields from Engineering Fundamentals to Engineering Analysis, to evaluation through to Engineering Design

[4] In fact, one might think of the Technical Committee Informatics/Computer Science in combination with Technical Committees Mechanical Engineering / Process Engineering, Electrical Engineering and Information Technology and Civil Engineering, Geodesy and Architecture in the case of the Computational Engineering Master on the one side, and the Technical Committees Mechanical Engineering / Process Engineering and Electrical Engineering and Information Technology in the case of the Mechatronics and Sensor System Technology Master on the other.

[5] EQF stands for European Qualification Framework, see https://www.cedefop.europa.eu/de/events-and-projects/projects/european-qualifications-framework-eqf (Download: 04.11.2019)

[6] ILO 1: "Apply appropriate mathematical, science and core engineering methods to identify, formulate and solve electrical and computer engineering related problems […]"; ILO 3: "Analyze, design, program, develop and evaluate complex electrical, electronic systems, automation systems, embedded systems, power systems, communication systems to meet desired requirements in terms of general quality attributes and possible trade-offs presented within the given problem […]"

and Development. These learning objectives are further elaborated and supplemented by a bundle of non-technical skills and competences such as communication skills, language skills and social/teamwork abilities. However, with a view to stakeholders like other universities (particularly universities abroad) and possible employers, the peer panel strongly suggests to differentiate summative learning outcomes spanning all three specialisations of the Bachelor programme in order to point out more clearly the qualifications achieved in each specialisation track. This is felt even more necessary as the title of the degree programme could be better explained by broadly indicating the specialisation areas in the track-specific competence profiles. In this connection, the peers particularly expect that the track-specific qualification profiles are, inter alia, included into the respective Diploma Supplement.

Concerning the Master programme Mechatronics and Sensor Systems Technology, ILOs 1, 3 and 5[7] relate to the advanced theoretical and methodological foundations as well as software instruments for the identification, scientific description and methodical solution of engineering tasks related to mechatronic systems. In addition, particularly ILOs 4, 7 and 8 cover design and development competences in the field of Mechatronics and Sensor Systems. Again, a more detailed account of the related competences can be found in the list, and transferable skills are also adequately factored in.

Regarding the learning objectives of the Computational Engineering programme, the programme coordinators convincingly elaborate how through their acquired competences graduates of this master are able to apply computational methods and tools to different engineering areas such as Mechanical Engineering or Civil Engineering. They specify major competences in the field of Engineering Analysis in LOs 2, 5 and 6[8] and formulate adequate

[7] ILO 1: "Identify, formulate, and develop scientific models for mechatronics and sensor system technology based on theoretical insights and fundamental techniques […]"; ILO 3: "Classify and synthesize currently available methods, algorithms, and software to tackle new scientific and engineering problems in mechatronics & sensor system technology […]"; ILO 5: "Perform simulations with given methods using commercial software (ANSYS, Mathematica, LTSpice, MATLAB, Python, C++, etc.), or self-developed codes, or both […]".

[8] LO 2: "Recognize and categorize standard scientific and engineering problems into relevant branches (solid mechanics, fluid mechanics, thermodynamics, material, hybrids of multiple branches, etc.) and, subsequently, specific types (particular flow regime in fluid mechanics, elastic/plastic/fracture in solid mechanics, etc.) in the framework of applied mechanics." LO 5: "Assess the reliability of computation results obtained through a particular computational solution approach; then determine appropriate remedies for shortcomings that have been identified." LO 6: "Deconstruct a complex scientific/engineering problem into constituent components and, subsequently, identify ones that require computational approaches; integrate computational results with those from other approaches to form a comprehensive and coherent view—including the scientific/technical contexts and constraints, and social/economic/ecological/… aspects if applicable."

design and developmental qualifications in LOs 3, 4 and 7[9]. Transferable skills are taken note of in the detailed list of intended learning outcomes as well. The Master programme does have an obvious bias to a more theoretically oriented education in the Computational Engineering field as is apparent in its curricular design and underlined through the learning objectives. Although the available statistical data is of only limited significance understandably, it clearly reveals the programme to be generally aiming at both graduates pursuing an academic career as lecturers and researchers as well as graduates working in R&D or other departments of companies. The programme review report shows that the programme coordinators were fully aware of this. As a result, VGU plans to offer two versions of the programme with different target groups. On the one hand, there is the four-semester full-time degree programme primarily focussing on graduates interested in an academic career in science and universities. On the other is a shortened three-semester programme track not yet implemented which more strictly follows the qualification demands of the local Vietnamese labour market. Although this would be a reasonable supplement of the predominant science and research focus of the four-semester track, it is noticeable that this track according to its learning objectives aims at job opportunities in companies as well. The peers therefore fully subscribe to the programme review report's conclusion concerning a general enlargement of profession- and application components in the revised programme. Consequently, the panel appreciates the curricular steps the programme designers have taken in that regard with the revised curriculum (see below chap. 1.3).

Apart from the cautionary remarks concerning the Bachelor programme, the peers generally consider the defined programme learning objectives adequate.

Criterion 1.2 Name of the degree programme

Evidence:

- Respective chapter of the relevant SAR
- Art. 1 of the relevant Special/Specific Examination Regulation
- Audit discussions

[9] LO 3: "Identify suitable physical and mathematical models, then construct solution approaches using currently available computational tools, taking into account scientific and technical constraints and—if applicable—other constraints such as social, ecological, economic." LO 4: "Execute computations by either using available solutions (commercial or open source) or developing new computer programs—or a combination of both; manage and analyze the resultant datasets." LO 7: "Comprehend further advanced scientific models and computational tools; develop solution approaches anew if those currently available are deemed inadequate."

Preliminary assessment and analysis of the peers:
The peers thoroughly discuss whether the chosen programme names are suitable with respect to the programme-specific learning objectives (see previous chap.) and the respective curricula (see following chap.). They generally answer the question positively.

Regarding the Electrical and Computer Engineering programme, they particularly note that, although the present name of the programme ("Electrical Engineering and Information Technology") might be more familiar in the international Electrical Engineering community, the proposed name reasonably reflects the contents of the programme and adequately covers the three offered specialisations. The differentiation between Computer *Science* and Computer *Engineering* is clearly explained through these very specialisations and particularly, though not solely, through the Computer Engineering-related parts in the "Information & Communications" specialisation.

The title of the Master programme Mechatronics and Sensor Systems Technology in the view of the peers fits very well with the curriculum and the intended learning outcomes of the programme.

This applies also to the Computational Engineering Master in its revised version. The peers fully agree with the programme coordinators that the English programme name accords with the international use of that title. At the same time, they acknowledge that the original Vietnamese name is up to change due to misperceptions it seemingly has caused in the past. They assume that VGU and the Faculty of Engineering will finally decide on the proper Vietnamese name which is already about to be submitted to the Presidential Board. Consequently, this issue in their opinion needs no further action on VGU's side.

Criterion 1.3 Curriculum

Evidence:

- Relevant chapter in the respective SAR
- Curriculum mapping in the respective module catalogue/module handbook, Appendices A2 (ECE), 9 (CompENG), A3 (MST) of the related SARs
- Module catalogue/module handbook, Appendices A2 (ECE), 9 (CompENG), A3 (MST) of the related SARs
- Programme review reports, Appendices A3 (ECE), 5 (CompENG), A2 (MST) of the related SARs
- Module Evaluation Result Report Academic Year 2017 – 18, Appendix C6 (ECE), 22 (CompENG), C5 (MST) of the related SARs

- Program Evaluation Result Report ST2017-WT2017-ST2018, Appendices C7 (ECE), 23 (CompENG), C6 (MST) of the related SARs
- Audit discussions

Preliminary assessment and analysis of the peers:
The Bachelor and Master degree programmes under review have mostly been running and further developed for nearly 10 years. The peers acknowledge the ambitious strategy of setting up German-style degree programmes in a bi-national university. They honour the manifold difficulties any such undertaking has to overcome in order to not only function as an institution but also to establish and keep running degree programmes with mixed personnel of both countries. In that respect, the peer panel lauds that VGU and particularly the Faculty of Engineering have managed to set up and constantly further develop the Bachelor and Master programmes under consideration. They could see that especially the Bachelor Electrical and Computer Engineering and (to a certain extent also) the Master Mechatronics and Sensor Systems Technology are very much tailored according to the needs of the industry and thus display a peculiar orientation towards ready-to-use theoretical knowledge and application areas in the professional engineering world. Otherwise, the Computational Engineering Master is undoubtedly a more scientific and research-oriented study programme. Since not many comparable Master programmes could be found even on an international scale, the graduates of this programme arguably face very good job opportunities. Although the local Vietnamese industry is only slowly absorbing the highly qualified workforce emanating from the Computational Engineering Master, the peers are convinced of the potential perspectives of graduates on an ever-growing labour market for this kind of an interdisciplinary Engineering competence profile.

The more application- or more research-oriented approach VGU decided to follow in the different degree programmes are obviously owing to the German partner universities for each of them. While with Frankfurt University and Karlsruhe University two so-called Universities of Applied Sciences are partnering with VGU in a local version of their Electrical Engineering Bachelor and Mechatronics Master respectively, the Computational Engineering Master programme has been transferred from Bochum University and even there designed strictly scientifically and research-oriented. From the peers' perspective, the different nature and outlook of the programmes is therefore well founded and justified. However, considering that the accreditation procedure takes place in the last stage of a transition process called "Vietnamization", in which the sole ownership of the programmes is gradually taken over by VGU, the Faculty faces a double-sided challenge. On the one hand, it will have to offer the programmes on its own terms; on the other side, VGU will wish to keep the network of German partner universities and, in particular, the programme transferring partner universities who heavily contributed to the programmes in the past. This is

explicitly expressed not only in keeping at least a limited margin of flying faculty of the partner institutions, which shall not decrease below 20%, but also in the offering of a double degree version of all degree programmes under review. The peers subscribe to the view that the latter requires VGU to broadly retain the contents and even the structure of the degree programmes in order to facilitate the recognition of student achievements at either university for awarding the Bachelor or Master degree.

Moreover, peers appreciate that periodical programme reviews have been made an obligatory part of the transition process of the programmes leading to the handover of the ownership to VGU. In its "Program Review Reports" VGU and the Faculty of Engineering convincingly demonstrate responsiveness towards the critical comments, evaluations and suggestions of major stakeholders (such as Alumni and representatives of the industry, but also lecturers, lab engineers, programme assistants, and research & teaching assistants (RTA), and students). Collecting the assessments of all major stakeholders obviously helped a lot to identify deficiencies and shortcomings of the programmes and take care of them in designing the new curricula. The peers thus can see that decisive innovations in the new programme curricula can be traced back to the structured review process.

Thus, for instance, the concentration on introductory and English language proficiency courses in the first semester, the integration of a mandatory internship in the 7th semester as well as the establishment of three specialisation tracks in the 5th and 6th semester of the Bachelor Electrical and Computer Engineering are consequently derived from the review workshop and the information gathering leading up to it. From the peers' perspective, the curriculum mapping for the Bachelor programme shows that the defined programme learning objectives will be reached within the new curriculum. In turn – as has been suggested earlier in this report (see above chap. 1.1) –, the programme objectives adequately reflect the competence profile of the graduates of this programme, in particular in terms of the core engineering competencies as defined by the relevant SSC (Advanced Engineering Fundaments, Engineering Analysis, Engineering Design and Development, and Engineering Practice).

The Review Report of the Master programme Mechatronics and Sensor Systems Technology reveals that critical concerns do not so much affect the details of the new curriculum but its overall adequate reflection of the defined learning outcomes and target groups on both career paths: academic and industrial. The peers conclude that the programme coordinators have convincingly demonstrated in the curriculum mapping that the now clearly defined programme learning are adequately covered by the new curriculum. Again, the programme objectives in the eyes of the peers convey a reasonable picture of the qualification profile of the graduates of this programme, in particular in terms of the core engineering competencies as defined by the relevant SSC.

Regarding the Computational Engineering Master, the concept of introducing a double-track-scheme with a shorter professional track and a longer track for an academic target group can be attributed – as already mentioned – to the review process, although the former has not yet been implemented. Suggestions of including more practical trainings, exercises and case studies though (partly be delivered by practitioners and guest lecturers), apparently made their way into the new curriculum. Particularly this point fits perfectly well with the assessment of Computational Engineering students complaining about the lack of engineering applications and projects making use of the acquired theoretical knowledge in the field of Computational Engineering. As to this criticism, the peers recommend to appropriately observe whether the measures taken to increase the application focus of the curriculum are fitting the demands of both students and the labour market.

The panel thoroughly considers critical remarks of students with regard to the introductory module *Introduction to Computational Science and Engineering* suggesting it to be exemplary for assembling heterogeneous contents in a densely packed and tightly taught module. In their opinion, the assembling of the different parts of that module (Basic Programming with MATLAB, Numerical Mathematics, Computational Linear Algebra, Differential Equations and Finite Difference Approximations, and Introduction to Software Engineering) seems reasonable principally, although the "Introduction to Software Engineering" could have been placed in a different curricular context. However, the complaint is taken seriously in terms of the time-constraint under which this module and others are taught (block structure of teaching). This issue will be discussed later in this report (see below chap. 2.3).

The panel considers the curriculum mapping as adequate evidence that the pre-set learning objectives are covered by the new curriculum. In terms of the accreditation criteria, the equivalency of the programme learning objectives with those listed exemplary in the relevant SSC has been stated earlier (see above chap. 1.1), which is to say that core engineering competences at Master's level will be regularly acquired through completing the Computational Engineering programme.

It attests to this overall conclusion of the peers, that the industry representatives highly esteem the subject-related skills and competences of the programmes' graduates and particularly praise their ability to flexibly apply their knowledge to new tasks and work situations.

Criterion 1.4 Admission requirements

Evidence:

- Relevant Chapter of the respective SAR

- Art. 4 of the Specific Examination Regulation of the Bachelor in Electrical and Computer Engineering (Appendix B2 of the SAR); Art. 3 of the Special Examination Regulation for the Master in Science in Mechatronics and Sensor Systems Technology (Appendix B1 of the SAR); Art. 3 of the Specific Examination Regulation for the Master in Computational Engineering (Appendix 8 of the SAR)
- VGU Bachelor Admission Regulation, Appendix B3 (ECE)
- VGU Master Admission Regulation, Appendix 12 (CompENG)
- Audit discussions

Preliminary assessment and analysis of the peers:
The peers acknowledge that the admission requirements of the different degree programmes have been defined and bindingly laid down in the Bachelor and Master Admission Regulations in combination with the specific Examination Regulations of the degree programmes. Regarding the Bachelor programme, the peers see that applicants have to prove an upper -intermediate English level with at least an IELTS band 5.0 or equivalent and after that will have to pass one the two annual admission procedures. Either they pass an Entrance Examination consisting of a core test and an engineering-module subject-specific test or they successfully pass the national high school examination in the same year of application satisfying the minimum VGU admission scores (with subject groups including Mathematics, Physics and Chemistry/English). The peers further learn that in order to pass the foundation semester and proceed to the second semester students must prove an English level of at least IELTS band 6.0 and additionally succeed in the remaining two modules of this semester.

It is worth noting here that apart from those two modules (*Exploring Engineering* and *English for Engineering*) the whole foundation semester consists of altogether four German language modules. These modules, peers are told, aim at conveying students with sufficient German language skills to study a part of the curriculum in Germany, particularly in case of applying for a double degree at Frankfurt University of Applied Sciences. However, students are expected to acquire IELTS band 6.0 or higher for progression to the second semester; he/she is only conditionally admitted for one further semester if failing to obtain the requirements of the foundation year. Regarding this, in the peers' view only the study plan in the SAR includes an indication that the four German language modules must be substituted through English language courses unless applicants reach IELTS band 6.0 before commencing their studies. The panel learns that a language guideline illustrating this transparently already exists; this guideline has been provided for inspection during the onsite visit. Nevertheless, the panel suggests documenting the language regulation and requirement more transparently, for instance by referencing it in the admission rules. In this connection,

it might be properly brought to the students attention that students completing their studies are expected to possess German language skills at level A2, irrespective of whether they acquire these skills within the curriculum or extra-curricular.

Concerning the Master programme Mechatronics and Sensor Systems Technology, the peers note that applicants in the first instance must have a bachelor degree from a Higher Education Institution (HEI) with a study duration of at least six semesters (three years). Accepted disciplines are Mechatronic Engineering, Electrical Engineering, Telecommunications, Mechanical Engineering, Information Technology or a comparable subject. Furthermore, the Bachelor degree in a relevant discipline needs to be completed with a Grade-Point-Average (GPA) of 6.5 (10-point grading scale) at a minimum. In addition, applicants have to pass an Entrance Examination consisting of a written technical test and an English test. Concerning the English test, students must demonstrate an English language proficiency equivalent to B2 or above in accordance with the Common European Framework of Reference for Languages.

As the peers conclude from the admission rules, to be admitted to the Computational Engineering Master applicants must have a bachelor's degree in Civil Engineering, Mechanical Engineering, or a related engineering discipline or in Mathematics, Physics, or a comparable subject and with a study duration of minimally six semesters (three years). In addition, they too are expected to demonstrate English language proficiency equivalent to level B2 or above. Regarding the English proficiency, it is noted that conditional admission of applicants is possible if students evidence the required language proficiency in a fixed period of time.

Overall, the peers acknowledge that VGU strives to define admission requirements serving the aim of admitting applicants to the degree programmes who dispose of the required technical and language skills and competences and thus fit the expectations of successfully studying the programme. However, with regard to the Master programmes, applicants with very different Bachelor backgrounds qualify for the admission. Because of the interdisciplinary nature of the programmes, this does not per se negatively affect the overall study success in the programmes. In addition, the peers can see that in the Mechatronics and Sensor Systems Master at least, some fundamental courses in the first study period allow students with different educational backgrounds and qualifications to catch up in certain study fields, and thus to level their skills and competence basis. Nevertheless, transparency of rules and guidelines is an important issue in the accreditation criteria and contributes to the quality assurance purpose of admission rules as well. Therefore, the peers recommend to more clearly and precisely communicate which knowledge, skills and competences graduates of different Bachelor backgrounds are supposed to have or to acquire in the early study phases in order to achieve the programme learning objectives. Students

of the Computational Engineering programme for instance point explicitly to the fact that they are confronting demanding and heterogeneous course contents at the beginning of their studies, which to a certain extent seem to have caught them by surprise. A more detailed and transparent communication of required competences might thus be helpful in better preparing applicants and students for the initial stages of their studies and thus indirectly contribute to increasing the overall study success.

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

The peers highly value the constructive statement of the VGU with respect to the assessment of the aforementioned degree programmes as documented in this report. It its statement, VGU illustrates in part convincingly how it intends to remove certain shortcomings. Regarding the set of criteria referred to in this section, the peers nevertheless conclude that the outlined measures are *either not fully implemented* yet or do *not fully address the peers' criticism*.

Learning outcomes – Bachelor Electrical and Computer Engineering

As peers have detailed in their preliminary assessment, the track-related learning outcomes of the Electrical and Computer Engineering programme should be clearly outlined and made accessible in addition to the general programme learning outcomes applying to the programme as such. This would benefit their visibility and through implementation in the Diploma Supplement would serve the information needs of potential stakeholders (such as employers or other universities) as well. The peers take note of the new phrasing of the track-related learning outcomes in the statement of VGU and consider them appropriate. As they still not publicly available, the peers propose to keep a requirement to this end (see below, chap. F, A 3.).

Module Introduction to Computational Science and Engineering – Master Computational Engineering

The peers welcome the supplementary indications to that specific module given in VGU statement. As an introductory module to the core of the Master programme Computational Engineering, the panel appreciate this module on considerations of principle. Consequently, they explicitly did not follow the criticism of some students who suppose heterogeneous or incoherent contents of module. Rather, in its preliminary assessment the peers took the module as exemplary for the generally demanding block-teaching mode. This issue is treated at several instances in the report and does not put particular stress on the said module. More recent evaluation results depicting this module as just about adequate in

terms of content and level thus fail to address the point of discussion relevant in this connection.

Language proficiency requirements – Bachelor Electrical and Computer Engineering

The panel takes note that VGU will undertake further efforts to better communicate the language proficiency students are expected to have or to acquire in both German and English. For transparency reasons, it would be worthwhile and above all legally certain tailoring the admission rules accordingly. Updating and activating the related information policy of the degree programme, as indicated in the report, should be a helpful supplementary instrument for this purpose.

Admission requirements – Master Mechatronics and Sensor Systems Technology, Master Computational Engineering

The peers are thankful for the additional background information regarding recent intakes, particularly in the Computational Engineering programme. The panel particularly appreciates VGUs general approval of the need to transparently inform about and communicate the subject-specific knowledge applicants of the degree programmes are expected in order to qualify for admission. However, as this principle prevails in Master programmes irrespective of peculiar conditions and explicit student complaints, it has to be specifically stressed in the case of interdisciplinary Master programmes such as those under review. Referring to the objections of a minority of students, which moreover turns out to be easily identifiable and thus might have even better not been mentioned here, is detracting from the peers point of view. Again, regarding the broad access of applicants with different Bachelor degree backgrounds in both Master programmes, the peers consider it meaningful to transparently communicate, which subject-specific knowledge, skills and competences applicants are supposed to have in order to fully qualify for the respective programme. The initial steps VGU has taken in this respect are welcomed. To underline the argument, the peers still propose a recommendation to that end (see below, chap. F, E 5.).

Fitness for Professional Purpose – Master Computational Engineering

The peer panel appreciates VGU's efforts to somewhat qualify the theoretical bias of the Computational Engineering programme in favour of strengthening its application focus. In the process of further developing the Master programme, it should be observed, whether the measures taken in that regard are fitting the demands of both the students and the labour market. The peers consider including a respective recommendation as appropriate (see below, chap. F, E 7.).

2. The degree programme: structures, methods and implementation

Criterion 2.1 Structure and modules

Evidence:

- Relevant chapter in the respective SAR
- Curriculum of each degree programme, see Appendix of this report and also Annexes to the programme-specific Examination Regulations, Appendices B2 (ECE), B1 (MST) and 8 (CompENG)
- Module catalogue/module handbook, Appendices A2 (ECE), 9 (CompENG), A3 (MST) of the related SARs
- Module Evaluation Result Report Academic Year 2017 – 18, Appendix C6 (ECE), 22 (CompENG), C5 (MST) of the related SARs
- Program Evaluation Result Report ST2017-WT2017-ST2018, Appendices C7 (ECE), 23 (CompENG), C6 (MST) of the related SARs
- Employability Survey Result Report 2017, Appendices C9 (ECE), 25 (CompENG), C8 (MST) of the related SARs
- Specific Examination Regulation for the Bachelor in Electrical & Computer Engineering at Vietnamese-German University, Appendix B2 of the SAR
- Double-Degree Agreement between Ruhr-Universität Bochum / Faculty of Civil and Environmental Engineering and Vietnamese-German University (DRAFT), Appendix 13 of the SAR
- Audit discussions

Preliminary assessment and analysis of the peers:

The peer panel takes note that all degree programmes consist of modules as self-contained teaching and learning units. The modules in the Bachelor programme Electrical and Computer Engineering generally count 5 ECTS, and almost all modules in the Master Computational Engineering are awarded 6 ECTS. The volume and sequence of the modules is found to be adequate. This applies to the Master programme Mechatronics and Sensor Systems Technology too, which is generally comprised of two-unit modules with 6 ECTS each and 3 ECTS per unit. The peers acknowledge that the module structure particularly in the latter case mirrors the reference programme at the German partner university (Karlsruhe University of Applied Sciences). In addition, they understand the adaptation of the module structure (and content) as a plausible strategy to facilitate the establishment of double degree

programmes since it considerably contributes to ensuring the equivalency of the contents and learning outcomes.

As to the coherence of the modules, the discussion with students yield indications that the coordination between lectures and labs in the Bachelor programme could be improved, although the peers admit that this is not always possible. Nevertheless, they advise the Faculty of Engineering to put more weight on the coordination issue in the future.

Despite the overall positive picture, the piecemeal-modularization in the Master Mechatronics and Sensor Systems Technology is per se demanding for the students, the more so when embedded in a tight block-teaching structure. The feasibility of this concept essentially depends on the coherence of the course content and the coordination of the unit lectures and on how this is reflected in the applied examination methods. Regarding this, neither the students' comments nor the available evaluation results suggest that the modules are composed of incoherent subjects. Still, in order to raise the awareness of the strong interrelation between the module structure, the coordination of lectures and the examination of modules (instead of subjects), the panel recommends to reflect comprehensively the contents and learning outcomes of the modules in the planned assessment methods (see below chap. 3).

What is obviously burdening students, however, is the block-teaching structure used especially in the Master programmes. Block teaching means offering the modules in short (usually two to three weeks) periods along with a subsequent preparation and examination period (of usually one week) and afterwards moving on to the next module. Criticism about this teaching method comes not only from the students during the audit discussions, but has also been voiced in the most recent evaluation results. It is understandable that during the founding stages of VGU and the implementation process of the programmes, the Faculty would have been hardly able to run the latter without the intensive collaboration of professors from its German partners (so-called "Flying Faculty"). Yet the teaching time available for the flying faculty during the semester is limited. However, this pressing situation should have been passed now. VGU itself declares the reduction of the flying faculty to a maximum teaching load of 20% in each programme as one of the core issues in the final stages of "Vietnamization" process. The peers are convinced that academic coordinators and staff to their best knowledge have been adapting teaching strategies, which fit the learning objectives within the block-teaching framework. And they even admit that this teaching strategy could be applied with astonishing success under certain conditions. Thus, the Program Evaluation Result Report of 2018 generally reveals astounding positive results under the circumstances, although significant differences in the evaluation of individual items occur (and need to be considered). Nevertheless, the peer panel is of the opinion that block teaching as regular teaching mode is overly challenging the students' ability to

fully comprehend and deepen newly acquired knowledge. The panel understands that it will be difficult to include lectures from flying faculty of the German partner universities other than in the block-teaching mode. In summary however, it strongly advices VGU to adapt the block-teaching structure of the programmes concerned in such manner that students have sufficient time to better grasp the course content. In this connection, the peers highly appreciate that VGU and the Faculty of Engineering have already taken steps to change to linear teaching across the semester term as regular teaching mode (with few exceptions where necessary).

The peer panel takes note that labs, projects, Industry projects internships and final theses in cooperation with industrial companies of the field adequately correspond to the demands of engineering practice, particularly in the Bachelor programme Electrical and Computer Engineering and in the Master programme Mechatronics and Sensor Systems Technology. Due to the outspoken scientific and research-oriented design of the programme, this finding does not apply to the Master Computational Engineering in a comparable way. Nevertheless, as peers could see, the programme coordinators have taken on suggestions of stakeholders to increase somewhat the application orientation of the theoretical parts in order to better match the expectations of the students and the targeted engineering branches – even apart from the principal idea of a professional track beside the regular four semester full-time track.

Regarding the Bachelor Electrical and Computer Engineering, the peers positively note the integration of a full-semester industrial internship in the new curriculum, which will contribute significantly to the employability of the graduates. Concerning the Master Mechatronics and Sensor Systems Technology, they acknowledge that major efforts have been undertaken to clearly identify the orientation towards the relevant industrial labour market through tailoring the programme learning objectives and contents accordingly on the one hand without waiving opportunities for applied research on the other hand. This seemingly follows cautionary remarks of stakeholders and is certainly worthwhile with a view to the results of the Employability Report (2017). The latter shows almost all (responding) alumni occupying a job in the industry at the time and virtually none having been engaged in further academic education.

With a slightly different weighting, the Computational Engineering Master has evolved in such manner that without reducing its scientific profile and research orientation in general efforts are made to make the programme more attractive to students and more applicable to industry companies and to a wider range of engineering fields. This has is well received by the peers, since it has been an issue in the surveys preceding the review workshop as well as in the discussion with students during the onsite-visit.

Regarding the industrial internship in the Bachelor programme Electrical and Computer Engineering, the peers note that supervision by two supervisors of both VGU and the company is stipulated in the programme-specific Examination Regulation as is the student's requirement to produce a report about his/her internship within two weeks after finishing the working practice (Art. 9). This is positively taken note of with regard to the intended learning outcomes of the internship and ultimately its quality assurance. However, the programme-specific examination rules also stipulate with respect to the option of earning a double degree of VGU and Frankfurt University of Applied Science that in the latter case the internship must follow the relevant guidelines at Frankfurt UAS. The peers learnt during the onsite visit that VGU is intend to adapt those guidelines for further instructions in the Vietnamese Bachelor programme as well. Thus, peers ask to provide the adapted version of the Guidelines should it be available already or otherwise to submit it in the course of the accreditation procedure.

Similarly, the Master Mechatronics and Sensor Systems Technology includes a module "Scientific Project" (altogether 6 ECTS), which is described as "Industrial Project" in the study plan according to its regular place of performance. This name appears to be somewhat disputable since the *Scientific Project* according to the module description can also take place in a research institution. Nevertheless, the module description sufficiently outlines that Faculty staff responsibly supervise the student's assignments in the project and that the students are required to report about the project progress as well as to finally give a presentation about the project results.

It is welcomed that the Bachelor programme with its three specialisations ("Automation Technology", "Energy Technology", and "Information & Communications Technology") and the Master programmes in the respective area of electives, though to a limited degree in the Mechatronics and Sensor Systems Technology Master (altogether 12 ECTS), gives room for the students' individual study profile. With a view to the Bachelor programme, the peers discuss the lack of electives beside the specialisation tracks, but otherwise could follow the argument to dispense with this option for the time being for reasons of substance and limited resources. Regarding the only limited electives catalogue in the Master Mechatronics and Sensor Systems Technology, the peers admit that bringing students with comparatively different Bachelor backgrounds (see chap. 1.4) to a common Master qualification level in the highly interdisciplinary engineering field of Mechatronics and Sensor Systems requires a broadly pre-set curriculum beside necessary fundamentals leaving little space for more electives. In both cases, the panel suggests considering to implement (further) electives according to technological developments, the demands of the labour market and the experiences in the new study programmes.

The curricula do not foresee a timeframe explicitly reserved for study periods at other universities either in Vietnam or abroad. Otherwise, from their initial implementation onwards the programmes have been conducted in close contact and cooperation with the German university partners and a network of the partner universities in Germany. Thus, study periods in Germany were a very common, in the Bachelor programme temporarily even mandatory feature of the programmes. In accordance with that, rules for the recognition of learning achievements at other universities in line with the Lisbon Convention are in place. In addition, all programmes are taught in English, thus preparing students with the necessary language skills to go for a stay abroad. Moreover, all curricula of the programmes under review to a certain degree are taught by flying faculty of German professors, introducing students to the German language, culture, and higher education system. Since the study programmes are more or less tailored in accordance with the reference programmes at the German partner universities, they provide principally good starting conditions for the mobility of the Vietnamese students. Consequently, the latter are well prepared, especially given the weight laid on sufficient English (and to a certain extent also German) language proficiency of students.

As the peers learnt, these conditions will be maintained and even improved by the time of completing the "Vietnamization process". All programmes shall then be offered in a local Vietnamese version with the award of a VGU degree and a double degree version adding the award of the (Bachelor or Master) degree of the respective partner university. However, by now only in the case of the Computational Engineering Master programme the requirements qualifying for the double degree programme have been meticulously regulated in a draft "Double Degree Agreement" between VGU and Bochum University. In the case of the already finalized "Agreement for an International Graduate Student Exchange Program Leading to a Double Degree" between VGU and Karlsruhe University of Applied Sciences, conditions for the award of the double degree remain somewhat unclear. A correspondent agreement for the Bachelor Electrical and Computer Engineering is reportedly worked on at present. Consequences of this in terms of the peers' assessment of the double degree versions are drawn below in chapter 5.3.

Apart from that, important provisions for the double degree in the Electrical and Computer Engineering Bachelor could be inferred from the programme-specific Examination Regulation. Thus, students pursuing the double degree are expected to study the 5th semester completely at Frankfurt UAS (Art. 5 para 3) and successfully complete their internship in a company certified by Frankfurt UAS (Art. 6 para 2) according to the Internship Regulation at Frankfurt UAS (Art. 9 para 4). Furthermore, regarding the modules to be passed in the 5th semester, the examination rules of Frankfurt UAS apply in the double degree regime.

The draft agreement about the double degree in the Computational Engineering Master appears to be thoughtful and reasonable, not least due to the coordinated and joint structure and curricular content. It is nevertheless worthwhile noting that students do not need to study in Germany in order to qualify for the Bochum University Master degree. According to the Double Degree agreement (chap. 4), it will suffice acquiring 18 ECTS in modules taught by Bochum University lecturers and having the Master's thesis supervised and assessed by both university partners. The programme coordinators of both universities justify this regulation with the comparatively high study fees and additional living costs, which students would have to bear for their stay in Germany.

The latter in fact applies to all degree programmes under review. And although it might be an option to solve the problem the way indicated in the Computational Engineering Master, the peers would favour the actual mobility of students. Hence, they recommend strengthening the efforts in increasing the number of scholarships/stipends. From their perspective, this might benefit the programmes twofold: firstly in attracting more students to the programmes and secondly in raising both the mobility of students and the international visibility of the programmes.

Criterion 2.2 Work load and credits

Evidence:

- Relevant chapter in the respective SAR
- Programme-specific Examination Regulations for the degree programmes, Appendices B2 (ECE), 8 (CompENG), B1 (MST)
- General Examination Regulation for Bachelor and Master Programs at Vietnamese-German University (henceforward GER), Appendix B1 (ECE)
- Module catalogue/module handbook, Appendices A2 (ECE), 9 (CompENG), A3 (MST) of the related SARs
- Module Evaluation Result Report Academic Year 2017 – 18, Appendix C6 (ECE), 22 (CompENG), C5 (MST) of the related SARs
- Program Evaluation Result Report ST2017-WT2017-ST2018, Appendices C7 (ECE), 23 (CompENG), C6 (MST) of the related SARs
- Audit discussions

Preliminary assessment and analysis of the peers:

The peers note that VGU has fully implemented the ECTS for the degree programmes under review. According to the study schedules of the programmes each semester consists of

modules with a credit volume of 30 ECTS, with 1 ECTS counting 30 hours of student workload (Art. 9 GER). While most of the modules of the Bachelor programme are attributed 5 ECTS, the modules of the Master programmes usually count 6 ECTS, with the distinctive feature of segmented modules in the Master Mechatronics and Sensor Systems Technology consisting of mostly two 3-ECTS units each.

The peer panel appreciates that the student workload is a regular item of the module evaluations, which are conducted on a regular basis according to the Evaluation Regulation. The results provide an important indicator of the adequacy of the credit point allocation as well as for the identification of possible imbalances of modules in terms of content and/or assessments. As the most recent results of the module and programme evaluation concurrently reveal, the allocation of credit points and related calculation of student workload seems broadly realistic for the Electrical and Computer Engineering Bachelor as well as the Mechatronics Master programme, but rather unfounded in the Computational Engineering Master. This finding was also reflected in the students' responses during the onsite visit at VGU. Considering the critical assessment of the block structure of teaching, the results for the Computational Engineering Master come as little surprise for the peers. The VGU authors of the SAR themselves point to this possible cause. Astonishing is rather the students' content with the workload distribution in the Mechatronics Master. But here too the evaluation results contain indications of overburdening the students through the combined impact of a high number of subjects and the block scheme of teaching.

As discussed earlier, the peers consider changes in the block teaching structure of the Master programmes necessary and welcome related internal discussions of the responsible Faculty management. In addition, the peer panel suggests improving the regular workload evaluation and its follow-up process of adapting the ECTS distribution or the module content accordingly. Providing students with enough time to work through and fully comprehend their lectures will positively affect the alignment of the teaching and learning activities to the achievement of the expected learning outcomes and to creating a sustainable and motivating learning environment.

Criterion 2.3 Teaching methodology

Evidence:

- Relevant chapter in the respective SAR
- Module Evaluation Result Report Academic Year 2017 – 18, Appendix C6 (ECE), 22 (CompENG), C5 (MST) of the related SARs
- Program Evaluation Result Report ST2017-WT2017-ST2018, Appendices C7 (ECE), 23 (CompENG), C6 (MST) of the related SARs

- Audit discussions

Preliminary assessment and analysis of the peers:
The peers learn that lectures, exercises, labs, case studies, seminars, practical training in companies (Internship in the ECE Bachelor, Industry project in the MST Master) and Bachelor/Master theses with practical work are the core educational methods practiced in the programmes under consideration. They positively note that the mentioned teaching methodology is principally applied to establish a positive learning environment and encourage active and self-directed learning of students. In addition, the panel could see that the teaching and learning activities are aligned to the achievement of the intended learning outcomes. Thus, for instance, projects and internships in cooperation with industrial companies introduce students to the technology market of the respective branch and the demands of technical production or research departments as do research projects and theses with a view to the specific challenges of applied or fundamental research. Leading students to an increasingly self-directed learning attitude, particularly in the Master programmes, requires at first to engaging them in class activities through deliberately designed questions as well as a variety of learning styles such as project proposals, group assignments, and seminars. Supported and supervised learning in such learning settings are the basis on which effective self-study periods can build. The reported didactical training offerings for and activities of the teaching staff also contribute to the learner-centred didactical approach of the Faculty of Engineering.

However – as previously discussed (see above chap. 2.1 and 2.2) –, even the best mix of modern pedagogical and multimedia-supported learning methods in the eyes of the peers could barely avoid hampering effects of an overly intensive use of a block-teaching scheme, particularly in demanding engineering degree programmes at Master level. This assumption resonates somewhat with the evaluation results, especially in the case of the Computational Engineering Master – in the supposed items significantly contrasting the findings for the Mechatronics Master[10]. Admittedly, the evaluation results are somewhat ambiguous in this respect, since data of the *module* evaluation (across three semesters 2017 to 2018) show a much more positive picture in terms of teaching methods for the Computational Engineering programme too.[11] Otherwise, students normally would not necessarily draw the line between the teaching methodology on the one hand and the teaching structure on the other and, after all, are not asked to do so in the surveys. To a certain extent this might explain the differences and the apparent inconsistency.

[10] Cf. Program Evaluation Result Report (ST2017 – WT 2017 – ST 2018), p. 28, 30 (for instance Appendix C7 (ECE)).
[11] Cf. Module Evaluation Result Report Year 2017 – 18, p. 16 (for instance Appendix C6 (ECE)).

Criterion 2.4 Support and assistance

Evidence:

- Relevant chapter in the respective SAR
- Service Evaluation Survey Result Report 2017 – 2018, Appendices C8 (ECE), 24 (CompENG), C7 (MST) of the related SARs
- Audit discussions

Preliminary assessment and analysis of the peers:

The peers get a comprehensive impression of the offers related to support and assistance of the students at VGU. On the programme level, each one disposes of a programme/academic coordinator responsible for the programme- and study-related issues and a programme/academic assistant taking care primarily of the organisational and administrative issues of the programme. Additionally, all lecturers are available for consulting students in study matters. Study- and module-related information is provided primarily through the module catalogues and on the respective VGU websites. Furthermore, the Academic and Student Affairs Department offers psychological consulting for students.

The auditors conclude that VGU and the Faculty of Engineering make adequate resources available to provide individual assistance, advice and support for all students. The services evaluation results appear to be in accordance with this assumption. Though positive in all degree programmes under review, the results for the Bachelor programme and particularly the Computational Engineering Master are exceptional.[12] Therefore, the peers were surprised by critical comments from students voiced in the discussions during the audit visit that information channels for and consultation of especially foreign students are not matching the quality aims VGU proclaims for its student services. This problem might be partly traced back to students failing to proactively seeking the support of students' services and faculty staff. Additionally, since only a fraction of students explicitly confirmed this criticism, its significance might be limited. Notwithstanding these possible explanations, the peers consider the students' critical comment as serious. They do not doubt that foreign students – after their admittance to the programmes – in principal have equal access to the good student services of VGU. But they have concerns that the practical arrangements and communication channels work well for this student group. This is why the panel urges VGU/the faculty to take immediate measures to improve the study information and guidance for international students.

[12] Cf. Service Evaluation Survey Result Report 2017 – 2018, p. 12f., 17 (for instance Appendix C8 (ECE)).

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

The peers highly value the constructive statement of the VGU to the assessment of the aforementioned degree programmes as documented in this report. With regard to set of criteria referred to in this section, the peers nevertheless conclude that further improvements either must be acquired or should be aimed at. Thus, the requirements of the above-mentioned criterion set are *not yet fully met*.

Internship guidelines – Bachelor Electrical and Computer Engineering

The peer panel positively notes the submission of the draft Internship Guidelines for the Bachelor programme Electrical & Computer Engineering at VGU". These guidelines in their opinion provide ample evidence that the mandatory internship has been meaningfully integrated into the curriculum of the programme and is supervised by commissioners of the companies as well as by responsible consultants of VGU. In addition, it is sufficiently regulated that VGU resumes the overall responsibility for the admission to as well as the conduct and recognition of the internships. In addition, the guidelines bindingly prescribe that students are expected to provide a report about the internship, for which certain standards are to be met. Although the guidelines have not been put into force so far, the peers have no doubt that VGU will validate them in due time. Consequently, the peers consider it sufficient that VGU evidences the binding version of the guidelines after its publication without further request. Besides, the panel points to an apparent translation error in Art. 3 clause 6 ("implementation of the internship in companies, companies or institutions outside the Federal Republic of Germany" which certainly should read "outside Vietnam").

Teaching structure and methods – Master Mechatronics and Sensor Systems Technology, Master Computational Engineering

The block teaching structure in the two mentioned Master programmes has been discussed at length during the onsite-visit of the panel at VGU. Considering the pros and cons of this teaching and learning mode and, in particular, its reception by the students, the peers conclude that VGU should introduce major changes in the way of scheduling the teaching and learning process. In this regard, the panel appreciates very much that VGU has already decided to proceed accordingly from the summer semester 2020 onwards. The exceptions reserved for the Flying Faculty are reasonable and acceptable. However, until VGU's plans in this regard have been successfully implemented, the panel keeps proposing a requirement formulated to this end during the onsite-visit (see below, chap. F, A 4.).

Electives in the Master programmes

The peers take note of VGUs argument of low student numbers and limited resources for additional elective courses in the Master programmes, particularly in the Master Mechatronics and Sensor Systems Technology. Otherwise, they suggest including suitable modules from other programmes as electives – a strategy VGU is seemingly considering. Citing the restricted number of electives in the sister programme of Karlsruhe University of Applied Sciences is not convincing, still less when the process and the objectives of "Vietnamisation" of the degree programmes are to be taken seriously.

Workload of students

Again, the peer panel appreciates that VGU made the workload evaluation a regular item of the module evaluations. The panel acknowledges the reporting of most recent survey data indicating an overall adequate ECTS / Workload ratio in the Master programmes and in particular in the Computational Engineering Master in the HEI's statement. Whether the identified imbalances between credit point allocation and actual workload burden in the Computational Engineering Master programme and – to a lesser extent – in the Mechatronics Master are exaggerations of individual perceptions or meaningful discrepancies cannot be decided here. However, even if predominantly caused by singular perceptions, they might point to more serious underlying deficiencies such as the block-teaching mode practiced particularly in the Master programmes. In addition to changes the peers consider indispensable in that respect, they generally recommend improving on the regular workload monitoring and its follow-up process of adapting the ECTS distribution or the module content (see below, chap. F, E 2).

Mobility of students / international visibility of the programmes

As detailed in the preliminary assessment, increasing the number of scholarships/stipends might be an effective instrument to attract more students and raise both the mobility of students and the international visibility of the programmes. The peers support this idea through a respective recommendation (see below, chap. F, E 1.).

Study information and guidance for international students

The peers welcome the HEI's clarification of the services VGU already provides, especially for international students, in order to give them support and guidance and introduce them to their respective study programmes. The panel positively notes that VGU has taken additional measures to better resource these services and guarantee their punctual availability. The peers agree to the HEI's assumption that the occasionally dysfunctional success they spotted in the talks with the students may be attributed mostly to the remote study location of complaining students at HSMC campus (see also below chap. 4.3). Whether VGU's

efforts will serve the situation remains to be seen in the future. The peers are convinced that relocating the campus and bringing the Computational Engineering programme to the main campus will also contribute to improve the study conditions of international students in the degree programmes of the Faculty of Engineering. To sum up, the panel waives the idea of proposing a requirement to that end, but wants VGU to keep a close eye on it (see below, chap. F, E 3.).

3. Exams: System, concept and organization

Criterion 3 Exams: System, concept and organisation

Evidence:

- Relevant chapter in the respective SAR
- Programme-specific Examination Regulations for the degree programmes, Appendices B2 (ECE), 8 (CompENG), B1 (MST)
- General Examination Regulation for Bachelor and Master Programs at Vietnamese-German University (henceforward GER), Appendix B1 (ECE)
- Module catalogue/module handbook, Appendices A2 (ECE), 9 (CompENG), A3 (MST) of the related SARs
- Module Evaluation Result Report Academic Year 2017 – 18, Appendix C6 (ECE), 22 (CompENG), C5 (MST) of the related SARs
- Program Evaluation Result Report ST2017-WT2017-ST2018, Appendices C7 (ECE), 23 (CompENG), C6 (MST) of the related SARs
- Service Evaluation Survey Result Report 2017 – 2018, Appendices C8 (ECE), 24 (CompENG), C7 (MST) of the related SARs
- Audit discussions

Preliminary assessment and analysis of the peers:

The examination types for each module/course are defined in the module descriptions. Generally, the module coordinators claim to tailor the examinations according to the intended learning outcomes in the respective modules. Usually, exams in all degree programmes under review consist of different types of assessment including assignments, group project reports and presentations, midterm examinations, and a final exam. Presentations of lab or project results are apparently often practiced forms of oral examinations, in which students are supposed to discuss engineering problems and present possible solutions verbally. In the absence of examination performance statistics –which still play their

role in the quality assurance system of VGU –,[13] the examination system relies on a kind of continuous assessment in order to ensure the constant study progress of students and their overall study success. In any case, the apparent examination structure clearly pictures the faculty staff following the principle that different evaluation methods suit different learning outcomes.

With regard to the segmented, multi-piece modules of the Master Mechatronics and Sensor Systems Technology however, the peers argued whether the mentioned principle is strictly adhered to throughout the programme. In order to substantiate this, they underline that multi-piece modules are self-contained learning units only insofar as their single units/course/lectures are coordinated and comprehensively assessed according to the intended learning outcomes of the whole module. Formally, the segmented modules of the Master are presented as single teaching units in the module descriptions. Additionally, no manifest indications emerged during the onsite discussions questioning a comprehensive assessment of the two-unit-modules. Since an in-depth inspection on the issue is impossible in the accreditation framework, the peers nevertheless would like to bring the issue to the attention of the academic coordinators and lecturers. In that sense, they recommend reflecting comprehensively the contents and learning outcomes of the whole module in the planned assessment methods.

The examinations inspected during the onsite-visit have been found generally adequate in terms of requirements and qualification level (EQF level 6 and 7 respectively). The inspection of final theses also revealed an adequate quality level with respect to the scientific standard and qualification level.

In the opinion of the peers, the examination system is fair and transparent. They stress that the details about the examinations (forms and deadlines; registration and admission; pass and repetition; failure and withdrawal; etc.), the organization (examiners and assessors; roof reading rules; and fraud and breach), the assessment and recognition as well as about the thesis and completion of examination are stipulated in the general and specific examination regulations respectively. Rules of retaking the exams (usually three times at a maximum), the examination scheduling and the organisation and conduct seem to be working well. Here again though, students of the Master programmes and in particular the Master Computational Engineering complain about very short preparation time for examinations due to the block-teaching scheme of the programme (see previous chap. 2.1 and 2.2). Apart from this issue, the results of the Service Evaluation Survey (2017/18) confirm the overall very positive picture of the planning and organization of the examinations.

[13] Cf. below chap. 6 and: Quality indicators at VGU, available at: https://vgu.edu.vn/de/quality-indicators;jsessionid=D1306A88BA95407DD5EE39213C984BD4 (Download: 08.11.2019)

Nevertheless, the discussion with the students also reveal that not always qualified lecturers are assigned to the custody of exams. Consequently, in this case students do not have even the chance to clarify questions concerning the exam assignments. The peers consider this practice unacceptable – no matter how small the actual number of cases is – and urge VGU to ensure convincingly that qualified staff is at least available during the (final) examinations so that exam-related questions of students could be addressed properly.

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

The peers appreciate the clarifying comments of VGU in its statement regarding the multi-piece-modules in the Mechatronics Master and the examination supervising staff, particularly in the programmes taught at the HCMC campus (Master Computational Engineering). They welcome the HEI's proactive attitude, but insist for the time being VGU's declarations in both matters are announcements in essence awaiting their proper implementation. This is why the panel considers the above criterion *not sufficiently fulfilled yet*.

Supervising personnel for examinations

Until VGU provides evidence for effectively putting in place the announced new policy of ensuring that qualified personnel is supervising the examinations in the degree programmes under consideration, a related requirement is considered adequate (see below, chapter F, A 1.).

Examinations of multi-pieced modules – Master Mechatronics and Sensor Systems Technology

The peer positively note that VGU will take special care of reflecting the whole module and its learning objectives in the examinations of the multi-pieced modules of this Master programme. Nevertheless, the issue should be looked after in the course of the re-accreditation procedure. Therefore, the peers encourage VGU's announcement with a respective recommendation (see below, chap. F, E 6.).

4. Resources

Criterion 4.1 Staff

Evidence:

- Relevant chapter in the respective SAR

- Teaching staff information available at: https://vgu.edu.vn/de/faculty-of-engineering?fam=62696E682E6E744042696E68204E677579656E20546869656E (Download: 08.11.2019)
- Module catalogue/module handbook, Appendices A2 (ECE), 9 (CompENG), A3 (MST) of the related SARs
- Working regime of academic staff at Vietnamese-German-University as of 16 April 2019, Appendix B6 (ECE)
- Process Master Data Sheet – "Recruit lecturer", Appendix 32 (CompENG)
- Lecturer Recruitment Plan 2019 for the Vietnamese-German University, Appendix D1 (ECE)
- Process Master Data Sheet – "Recruit adjunct lecturers", Appendix B4 (ECE)
- Audit discussions

Preliminary assessment and analysis of the peers:
The peers learnt that for its five Bachelor and six Master degree programmes[14] the Faculty of Engineering disposes of 55 staff members (15 senior lecturers, 13 lecturers, 2 senior RTAs, 8 RTAs, 11 lab engineers and 5 administrative staff). They also note that the involvement of German flying faculty, which played a crucial role in establishing and running the programmes, shall be reduced to a maximum of roughly 20% of the curriculum after the transition of the ownership of the programmes to VGU. The panel highly values that VGU has managed to develop a significant local staff since the implementation of the programmes in both respects quantitatively and qualitatively. As the information on the VGU websites evidences, many of the staff members have graduated at western universities, among them a considerable proportion of PhD-holders. In addition to the German flying faculty and the network of German partner universities, close contacts of the local professors and lecturers to their degree awarding universities broaden the pool of university contacts or partners, where visiting lecturers or highly qualified salaried staff can be recruited. In this respect, the peers also welcome VGU's procedure for selecting "adjunct lectures", which serves the purpose of maintaining the intended quality standard for external teaching personnel as well. Thus, the peer panel is convinced that the teaching staff of the Faculty of Engineering is qualified for its teaching obligations. In addition, the peers would not principally argue with the assumption of the VGU and Faculty management that for the

[14] Bachelor programmes: Electrical Engineering and Information Technology, Computer Science, Mechanical Engineering, Civil Engineering, and Architecture; Master programmes: Business Information Systems, Computational Engineering, Sustainable Urban Development, Mechatronics and Sensor Systems Technology, Global Production Engineering and Management, and Water Technology.

time being the available teaching staff is also sufficient in numbers. Working hours, teaching time and research time are duly regulated and teaching staff members report an overall appropriate workload. Nevertheless, the panel misses any detailed information about the ratio of needed / available teaching load (taking into account reductions pursuant to organizational functions). The peers therefore ask for a plausible demonstration of sufficient teaching capacity, exemplarily for the upcoming study year.

The qualification of the teaching staff for the degree programmes under review and especially for the Master's programmes not least depends on the quality of its research activities. Since the core academic staff members are generally expected to do both teaching and research (the latter to a certain extent at least), it is worthwhile that the Faculty reports about a steadily increasing number of research projects in the relevant areas and of scientific papers and conference attendances of staff members.

Criterion 4.2 Staff development

Evidence:

- Relevant chapter in the respective SAR
- Regulation on Management of Scientific and Technological Activities at Vietnamese-German University, Appendix B5 (ECE)
- Regulation on the Promotion of Lecturers, Appendix B7 (ECE)
- Teaching staff Individual Performance Appraisal Form, Appendix C14 (ECE)
- Audit discussions

Preliminary assessment and analysis of the peers:

The peers positively note that the further development of its staff is one of the strategic quality aims of VGU. Measures to develop and improve the didactical abilities of staff members have already been mentioned; the peers are convinced that these efforts will pay off in maintaining and raising the quality of teaching. Similarly, the Faculty's support of the staff's engagement in conferences, workshops, seminars, training on subject matters, individual or collaborative research on a topic of professional interest, technology transfer etc. in the peers' opinion will contribute to keeping the curricula in line with scientific and technological developments.

The approach of targeted promoting staff members according to individual needs and interests (based on a form of self-appraisal) is promising in the eyes of the peers in that it allows a more structured and effective further development policy on a need basis. Incentives such as the regulated promotion of lectures establishing a career path for the second

tier teaching staff are also contributing to a motivated and enthusiastic teaching & research staff.

Criterion 4.3 Funds and equipment

Evidence:

- Relevant chapter in the respective SAR
- Cooperation agreements with the partner universities, Appendices D4 (ECE), 2 (CompENG), D3 (MST) of the respective SARs
- List of equipment types in the labs, Appendix A9 (ECE)
- List of Laboratory Equipment, Appendix A5 (MST)
- List of MST Books at Library, Appendix A8 (MST)
- List of books in CompENG collection, Appendix 34 (CompENG)
- Onsite inspection of relevant infrastructure and laboratories
- Audit discussions

Preliminary assessment and analysis of the peers:
The peers highly value the achievements of VGU and its partners in not only jointly establishing the degree programmes under review but also in maintaining and further developing their quality. In particular, they appreciate the gradual transition of the ownership of the study programmes to VGU in the so-called "Vietnamization" process. They are fully aware of the responsibility VGU is taking therewith, but also of the already existing physical and personnel basis, on which the transition process can rely on.

It seems that in the middle term – until 2025 according to the statement of the VGU management – the financial basis for running the programmes is secured. Until than a considerable share of the budget will be borne by the German Federal State of Hessen, the German Federal Ministry of Education and Research and the Vietnamese Ministry of Education and Training (MOET) respectively. Thus, as the peers understood, the German partners will pay a fixed amount of 3 Mio. EUR per year for administrative personnel and flying faculty from the German partner universities in the first instance. Otherwise, basic financing of the VGU is shared between MOET and VGU, regarding the latter essentially covered by student fees. At the end of the transition process – as peers understood – along with the full ownership of the programmes VGU shall assume the full financial responsibility for its degree programmes. The peers are aware that due to the comparatively remote location of the university and the relatively high student fees VGU is "condemned" to evolve into a well-recognized education institution for a highly qualified engineering workforce and an esteemed institution for applied research. Only then will VGU be able to compete with other

national and regional universities for the best students and to narrow its intake numbers to the target figures. This, in turn, will be necessary to generate enough revenues to sustain the university and its degree programmes independently. The peers are of the opinion that VGU and the Faculty of Engineering respectively until now have established a very solid fundament; employers and alumni concurrently value VGU as engineering education institution. With the new campus – still under construction but scheduled to be finished in 2020/21 –, the infrastructure and already good laboratory facilities will even improve, thus paving the way for VGU to gradually expand its research capacities as well.

In summary, the peers receive the impression that the financial basis of VGU is stable and sufficient in the medium term, while the long-term expectations are at the same time challenging and promising. Nevertheless, in order to have this picture adequately confirmed, they ask the university management to briefly detail the budgetary forecast across the accreditation period (five years) and the status of respective negotiations with the ministry.

The peers were especially impressed by the lab facilities created at the campus in Binh Duong. In their view, the labs fully fit international standards. At the same time, it seems inappropriate to them and negatively affecting the achievements of the study objectives that the Computational Engineering Master is located at the Ho-Chi-Minh-Campus, thus disconnecting students and the staff – although programme coordinators point to some staff always present there as contact persons. In this connection, students complain about dysfunctional information channels, occasionally poor accessibility of lecturers and an overall imperfect learning environment with negative side effects on the study motivation and even the study success. They clearly would favour the relocation of the programme to the Binh Duong campus and their fellow students. The peers fully agree with the students' view. The aim should be to provide students with an infrastructure fitting their needs in terms of teaching and learning as well as counselling and advice. On the other hand, the panel notices that the Faculty of Engineering is already aware of the issue and its potentially damaging consequences. The peers suspect that the imminent relocation of VGU to the new campus in 2020/21 will leave room to satisfactory arrangements in this regard. They therefore support the efforts to move the Computational Engineering Master to the new campus and recommend accordingly.

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

Overall, the peers consider the accreditation requirements regarding staff, funds and facilities of the degree programmes as *fulfilled*. The panel appreciates the additional information provided by VGU with respect to the teaching capacity (VGU teaching personal and Flying Faculty) as well as to the budgetary forecast of the university.

Teaching capacity

The peers express their thanks for the delivered tables demonstrating the overall available as opposed to the actual demanded workload in the degree programmes for the study year 2019/2020. The tables clearly show that the available teaching capacity (including the Flying Faculty) exceeds what is actually needed, leaving in fact a little reserve and a certain degree of flexibility in planning the teaching process of each degree programme. Thus, the peers formally state that the teaching capacity is sufficient to run the degree programmes.

Financial resources / Budgetary forecast

The peers are thankful for the additional information provided concerning the financial planning and the financial performance of VGU since the establishment of the university. The peers are spotting that since its formation VGU has to rely on funding through the German and Vietnamese governments to a considerable degree. But they could also see that the proportion of government funding is slowly decreasing, while VGU at the same time has managed to significantly raise its own revenues (through fees, services etc.). In this connection, the panel acknowledges that VGU has implemented or is implementing elaborate processes for developing annual budgetary forecasts and economic plans, serving as the basis for the negotiations with the involved governments as well as the other partners of VGU (DAAD, German universities). It becomes clear that the long-term subsistence of VGU large depends on the financial commitment of the Vietnamese government regarding the reliable compensation of foreseeable deficits in the upcoming decades. Taking into account the already existing consent of the Vietnamese government, the cooperation between the two Governments, the involvement of the other German partners and the available budgetary figures, the panel considers the actual financial situation as well as its prospects to be sustainable.

Location of the Master Computational Engineering

The peers seriously consider VGU's argument for the decision to maintain the Computational Engineering programme at HCMC campus and thus somewhat apart from the other engineering programmes at Binh Duong Campus. Concerning the major reasons of domestic students to favor the actual location as compared to Binh Duong, the peers fully understand that the responsible management at VGU fears to lose a major number of students for reasons of convenience, family and job obligations. The peers nevertheless consider the apparent and directly study-related benefits of a possible relocation of the Computational Engineering programme to be applying irrespective of any specific student group. The panel therefore appreciates that VGU is struggling to find a suitable solution for all sides involved, and strongly supports these activities (see below, chap. F, E 8.).

5. Transparency and documentation

Criterion 5.1 Module descriptions

Evidence:

- Module catalogue/module handbook, Appendices A2 (ECE), 9 (CompENG), A3 (MST) of the related SARs

Preliminary assessment and analysis of the peers:
The peers appreciate that the presented module catalogues (module handbooks) are available for the relevant stakeholders, in particular students and teaching staff. In their view, the module descriptions are complete, comprehensive und informative. All information regarding intended learning outcomes, contents, prerequisites, frequency of offering, credits and workload, introductory literature etc. could be found there. And even if the classification of the status of the module (Compulsory / Compulsory optional / Optional_Elective) needs to be clarified per module in the Electrical and Computer Engineering module handbook – the actual ambiguity perhaps being caused when producing the handbooks for the accreditation procedure –, the peers assume that this will be done in the regular course of revising the descriptions. Immediate action of VGU is not necessary in their view. The overall highly positive assessment of the quality of the module syllabuses in the Service Survey Result Report (2017/18) confirm to that.

The module descriptions are accessible to the students via internet, although obviously in a restricted area of the VGU websites only (“intranet”). It might be worthwhile therefore, to consider making the module catalogues and other information material publicly available so that applicants in Vietnam or elsewhere could inform themselves more comprehensively about the study programme of interest.

Criterion 5.2 Diploma and Diploma Supplement

Evidence:

- Exemplary Diploma Supplement only available for ECE programme, Appendix A8
- Exemplary Certificates per degree programme, Appendices A8 (ECE), 31 (CompENG), A7 (MST) of the respective SARs
- Exemplary Transcript of Records, Appendices A8 (ECE), 31 (CompENG), A7 (MST) of the respective SARs

Preliminary assessment and analysis of the peers:
The peers take note that VGU provided samples of programme-related certificates, Transcript of Records, and (in case of the ECE programme) also the Diploma Supplement. In

neither case is VGU the degree awarding institution, which reflects the actual status of the programme ownership. Thus, no final documents for the "new" programmes with VGU as the degree awarding institution have been presented. VGU is requested to deliver them along with its comments to the audit report, *if already available*. Otherwise, the documents will have to be prepared and submitted later.

In particular, this applies for the programme-specific Diploma Supplement, which must be in line with the recommendation of the European Commission detailing the relevant features of the respective programme including the structure, intended learning outcomes and content as well as the individual achievements.[15] In addition, the Diploma Supplement or the Transcript of Record must contain statistical information about the overall grade distribution in order to enable an assessment of the individual performance.[16]

Criterion 5.3 Relevant rules

Evidence:

- Programme-specific Examination Regulations for the degree programmes, Appendices B2 (ECE), 8 (CompENG), B1 (MST)
- General Examination Regulation for Bachelor and Master Programs at Vietnamese-German University as 14.08.2018, Appendix B1 (ECE)
- VGU Bachelor Admission Regulation as of 25.12.2018, Appendix B3 (ECE)
- VGU Master Admission Regulation as of 31.01.2019, Appendix 12 (CompENG)
- VGU Research Regulation as of 22.06.2017, Appendix B5 (ECE)
- Working regime of Academic Staff at VGU as of 16.04.2019, Appendix B6 (ECE)
- VGU Cooperation Agreements with respective German partner universities, Appendices D4 (ECE), 2 (CompENG), D3 (MST) of the respective SARs
- Double Degree Agreements between VGU and German partner universities, Appendices 13 (CompENG, Draft), D4 (MST) of the respective SARs

Preliminary assessment and analysis of the peers:

The peers acknowledge that all relevant rules and provisions concerning the admission, structure, organisation, recognition, assessment and completion of the studies of the

[15] Cf. http://www.ehea.info/Upload/document/ministerial_declarations/EHEAParis2018_Communique_AppendixIV_952782.pdf (Download: 08.11.2019)

[16] Cf. https://europass.cedefop.europa.eu/sites/default/files/ects-users-guide_en.pdf, chap. 4.3 Grade distribution, p. 39f. (Download: 08.11.2019)

"new" VGU programmes have been bindingly set in the general and programme-specific examination regulations.

They also notice that the presented documents represent a mixture of regulations partly applying to the "new" programmes starting with the intake 2019/20 and partly relating to the actual status of the ownership of the programmes. As to the latter, for instance the cooperation agreements between VGU and its German partner universities are based on the premise that the latter are the degree awarding institutions. At this point, there will be a major change after the transition of the full ownership of the programmes to VGU. From then on, VGU itself shall award the degree for its programmes, which is assumed in the presented general as well as programme-specific examination regulations.

This in turn is the basis, on which the double degree cooperation agreements between VGU and its German partners will rest. These double degree contracts were in the discussion process right now for the Electrical and Computational Engineering Bachelor and the Computational Engineering Master. While in case of the Computational Engineering Master a draft of the agreement has been presented, a final document seems to exist already for the Mechatronics and Sensor Systems Technology Master. However, the conditions of awarding the double degree in terms of minimal study obligations at either partner institution remain unclear to the peers and are in no way clarified in the programme-specific examination regulation of the Master programme, which not even mentions the double degree by name.[17] The peers conclude that the document base for the double degree versions of the programmes under review by now is too scarce and heterogeneous for a final assessment. The double degree tracks should therefore be excluded from the accreditation procedure by now and may be easily taken in when the transition process has been completed and the relevant agreements have been finally concluded.

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

The peers welcome the additional comments and documents provided by VGU with reference to the above-mentioned criterion after the onsite-visit. With a view to the programme-specific Diploma supplements submitted along with the statement of the HEI, the peers still consider the criterion as *not sufficiently fulfilled*.

Guidelines for internship – Bachelor Electrical and Computer Engineering

This issue is treated in the final assessment of chap. 3.

[17] Presumably Art. 4 para 5 of the programme-specific examination regulation is inter alia referring to the double degree without stating that explicitly (for instance through citing a double degree contract).

Samples of Diploma Supplements

The peers take note of the programme-specific Diploma Supplements provided by VGU after the onsite-visit. In these DS the respective German University and VGU jointly figure as awarding institutions, which might apply to the Double Degree programmes (not under consideration here), but not for the programmes under review, in which VGU is the sole degree awarding institution. Furthermore, still no statistical data could be found allowing external stakeholders to assess the performance of VGU graduates in comparison to others. Thus, the panel proposes to add a requirement requesting VGU to correct the mentioned instances of the DS (see below, chap. F, A 2.).

Double Degree programmes

The peers note that VGU agrees to exempt the double degree versions of the degree programmes from the current accreditation procedure due to yet incomplete documentation. These programmes may be included into the accreditation after finishing and supplementing the respective contracts between the partner universities in accordance with the above indications of the peers.

6. Quality management: quality assessment and development

Criterion 6 Quality management: quality assessment and development

Evidence:

- Relevant chapter of one of the SARs
- Many documents regarding Quality Assurance in the respective SARs, Appendices C1-15 (ECE), 1, 5, 14 - 17, 22-28 (CompENG), C1-14 (MST) of the respective SARs
- Program Review Report, Appendices A3 (ECE), 5 (CompENG), A2 (MST) of the respective SARs
- Quality Assurance Regulation, C4 (ECE)
- Evaluation Regulation as of 29.08.2017, Appendix C5 (ECE)
- Module Evaluation Result Report Academic Year 2017 – 18, Appendix C6 (ECE), 22 (CompENG), C5 (MST) of the related SARs
- Program Evaluation Result Report ST2017-WT2017-ST2018, Appendices C7 (ECE), 23 (CompENG), C6 (MST) of the related SARs

- Service Evaluation Survey Result Report 2017 – 2018, Appendices C8 (ECE), 24 (CompENG), C7 (MST) of the related SARs
- Employability Survey Result Report (Graduates 2017), Appendices C9 (ECE), 25 (CompENG), C8 (MST) of the related SARs
- Information of core quality assurance principles, processes, responsibilities and instruments available on the internet: https://vgu.edu.vn/en/quality-assurance-at-vgu (Download: 08.11.2019)
- Audit discussions

Preliminary assessment and analysis of the peers:
The peers positively note that VGU has developed and to a large extent already implemented a comprehensive quality assurance system. In a fundamental Quality Assurance (QA) Regulation, VGU defines the basic principles of its quality assurance policy, the organisational structure of implementing those principles university-wide, the instruments and methods used in the internal quality assurance processes, the extent and function of external quality assurance procedures and, finally, the performance indicators and underlying documentary basis. In an Evaluation Regulation, VGU has elaborated the regulatory framework for practicing the major QA instruments, which are module evaluations, graduate surveys, Alumni employability surveys, employer surveys etc. with each of them pursued on a regular basis. The (internal) quality handbook documents comprehensively the quality assurance principles, regulatory framework, processes, responsibilities and institutional and/or personal assignments in the internal QA. Peers understand that numerous documents are necessary as constituent parts of the regulatory framework for quality assurance and the reliable management of the university. Moreover, in order to assign responsibility unambiguously, the organizational structure, staff plans and job descriptions need to be available and transparent. Consequently – as VGU points out –, core, management and supporting processes are to be documented, accessible and regularly updated in a way that all employees are able to know and apply efficiently the relevant procedures. The peer panel notes that integrating these distributed documents and instruments in a transparent register is a major task of the QA office, which for that purpose has undertaken to develop and maintain a comprehensive Quality Handbook in form of an IT-based Quality and Organisation Manual.

These internal quality assurance framework and its founding documents read well thought, sophisticated, logical and consequential. Despite the inherent paradox of QA that it could never fully achieve its objectives without ultimately compromising its very purpose, there still remains plenty of work for VGU in improving the effective functioning of its QA procedures. Nevertheless, in the peers' opinion the QA strategy and instruments of VGU are

much more than just lip service to QA principles. The peers highly value what VGU and the Faculty of Engineering have achieved not just in setting up a QA system and designing suitable instruments, but no less in implementing processes and using the instruments for the further development of its study programmes. Survey instruments and evaluations covering the whole student life cycle and the core educational processes of VGU have been employed for gathering meaningful data and information about the achievement of the major quality aims. The positive impression the peers received from the reviewed study programmes is generally reflected in the available survey data, although some of the statistical data are still worth a closer look and follow up. The same applies for average results (mean values around three on the rating scale), which while positively rated principally also indicate the potential for improvements. The peers are convinced that the responsible QA officers at VGU and the Faculty management will analyse and discuss the data accordingly.

In particular, VGU has provided ample evidence that the relevant stakeholders have been effectively included in the most recent review process of the programmes and their adaptation and further development in accordance with the results of this review. The peers encourage the university to keep up these regular and incident-driven evaluations/surveys as structured internal quality assurance processes pursuing a steady quality development of VGU's study programmes. This will be even more necessary as VGU is explicitly intending to adapt the programmes particularly to the conditions and demands of the still evolving Vietnamese engineering labour market.

In this connection, the peers particularly welcome that students are actively engaged in the internal QA and by regulation act as a constituent part of the major QA bodies at VGU. Nevertheless, in the audit discussion some students criticized that lecturers do not always give feedback about the results of the module evaluations and possible follow up measures. Otherwise, the peers positively that usually lecturers seem to be responsive formally and informally in discussing shortcomings in the modules and appraising possible remedies.[18]

In summary, the peers attest the internal QA of VGU an overall good condition and a promising path to ensure a constant and effective further development of VGU's study programmes. The panel strongly encourages VGU to follow this path and additionally recommends to consequently close the feedback loop of the module/course evaluations thus ensuring that the students' response is effectively looked after.

[18] In the peers understanding of the Evaluation Regulation (Art. 7), lecturers and Academic Coordinators are not even supposed to do so formally.

Final assessment of the peers after the comment of the Higher Education Institution regarding criterion 6:

The requirements in terms of quality assurance, feedback cycles and the further development of the degree programme are *met satisfactorily* in the peers' opinion.

Quality assurance and course evaluation

The peers welcome the constructive comments of the HEI. They are convinced that VGU will take all measures necessary to ensure that the feedback loop in the course evaluations are effectively closed. They support VGU respective announcements with a recommendation, thus drawing the attention of the peers in the re-accreditation procedure on this matter (see below, chap. F, E 4.).

D Additional Documents

Before preparing their final assessment, the panel ask 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:

D 1. Plausible demonstration of sufficient teaching capacity, exemplarily for the upcoming study year [ASIIN 4.1]

D 2. Please detail in a brief overview the budgetary forecast for the accreditation period (five years) and the status of respective negotiations with the ministry [ASIIN 4.3]

D 3. Samples of Diploma Supplement for each degree programme, if already available [ASIIN 5.2]

D 4. Bachelor ECE: (Reported) provision / guidelines for the internship, if available [ASIIN 2.1, 5.3]

E Comment of the Higher Education Institution (25.11.2019)

The institution provided a substantial statement as well as the following additional documents:

- Cover letter ASIIN 191125
- Annotations to the Accreditation Report VGU Cluster ECE MST CE
- Teaching Capacity
- Budgetary forecast
- Sample of the Diploma Supplement for each Degree Programme
- Internship Guidelines for ECE students

F Summary: Peer recommendations (01.12.2019)

Taking into account the additional information and the comments given by the Vietnamese-German University, the peers summarize their analysis and **final assessment** for the award of the seals as follows:

Degree Programme	ASIIN-seal	Subject-specific label	Maximum duration of accreditation
Ba Electrical and Computer Engineering	With requirements for one year	–	30.09.2025
Ma Mechatronics and Sensor Systems Technology	With requirements for one year	–	30.09.2025
Ma Computational Engineering	With requirements for one year	–	30.09.2025

Requirements

For all degree programmes

A 1. (ASIIN 3) Ensure that qualified staff is available during the (final) examinations so that exam-related questions of students could be addressed properly.

A 2. (ASIIN 5.2) Provide a programme-specific Diploma Supplement in line with the recommendation of the European Commission detailing the relevant features of the respective programme including the structure, intended learning outcomes and content as well as the individual achievements. In addition, the Diploma Supplement or Transcript of Record must contain statistical information about the overall grade distribution in order to enable an assessment of the individual performance.

For the Bachelor programme Electrical and Computer Engineering

A 3. (ASIIN 1.1) Detail the track-related programme learning outcomes – as proposed in the HEI's statement – in order to put the related qualification profile more clearly for potential stakeholders. Integrate the specialisation-related learning outcomes in the Diploma Supplement.

For the Master programmes Mechatronics and Sensor Systems Technology and Computational Engineering

A 4. (ASIIN 2.1) Adapt the block-teaching structure in such manner that students have sufficient time to better grasp the course material.

Recommendations

For all degree programmes

E 1. (ASIIN 2.1) It is recommended to strengthen the efforts in increasing the number of scholarships/stipends in order to attract more students and raise both the mobility of students and the international visibility of the programmes.

E 2. (ASIIN 2.2) It is recommended to improve on the regular workload monitoring and its follow-up process of adapting the ECTS distribution or the module content, if necessary.

E 3. (ASIIN 2.4) It is recommended to particularly look after the proper availability of the already existing and additionally announced student services for international students.

E 4. (ASIIN 6) It is recommended to further implement and develop the quality assurance system in place. In particular, the feedback loop of the module/course evaluations should be closed consequently ensuring that the students' response is effectively looked after.

For the Master programmes Mechatronic Systems and Sensor Technology and Computational Engineering

E 5. (ASIIN 1.4) It is recommended to more precisely communicate the expected knowledge, skills and competences of graduates with different Bachelor degree background (such as Electrical Engineering, Mechanical Engineering, Physics, Mathematics etc.).

For the Master programme Mechatronic Systems and Sensor Technology

E 6. (ASIIN 3) It is recommended to reflect comprehensively the contents and learning outcomes of the segmented modules in the planned assessment methods.

For the Master programme Computational Engineering

E 7. (ASIIN 1.1, 1.3) It is recommended to observe whether the measures taken to increase the application focus of the curriculum are fitting the demands of both the students and the labour market.

E 8. (ASIIN 4.3) It is strongly recommended to either move the programme to the new campus or through other appropriate means provide a learning environment fitting the students' needs in terms of teaching and learning as well as counselling and advice.

G Comment of the Technical Committee 02 – Electrical Engineering / Information Technology (Circulation procedure November 2019)

Assessment and analysis for the award of the ASIIN seal:

The Technical Committee agrees with the assessment and recommended resolution of the peers without any changes.

The Technical Committee recommends the award of the seals as follows:

Degree Programme	ASIIN-seal	Subject-specific label	Maximum duration of accreditation
Ba Electrical and Computer Engineering	With requirements for one year	–	30.09.2025
Ma Mechatronics and Sensor Systems Technology	With requirements for one year	–	30.09.2025
Ma Computational Engineering	With requirements for one year	–	30.09.2025

H Decision of the Accreditation Commission (06.12.2019)

Assessment and analysis for the award of the ASIIN seal:

The Accreditation Commission discusses the procedure and agrees with the assessments and recommended resolution by the peers and the Technical Committee without changes.

The Accreditation Commission for Degree Programmes decides to award the following seals:

Degree Programme	ASIIN-seal	Subject-specific label	Maximum duration of accreditation
Ba Electrical and Computer Engineering	With requirements for one year	–	30.09.2025
Ma Mechatronics and Sensor Systems Technology	With requirements for one year	–	30.09.2025
Ma Computational Engineering	With requirements for one year	–	30.09.2025

Requirements

For all degree programmes

A 1. (ASIIN 3) Ensure that qualified staff is available during the (final) examinations so that exam-related questions of students could be addressed properly.

A 2. (ASIIN 5.2) Provide a programme-specific Diploma Supplement in line with the recommendation of the European Commission detailing the relevant features of the respective programme including the structure, intended learning outcomes and content as well as the individual achievements. In addition, the Diploma Supplement or Transcript of Record must contain statistical information about the overall grade distribution in order to enable an assessment of the individual performance.

For the Bachelor programme Electrical and Computer Engineering

A 3. (ASIIN 1.1) Detail the track-related programme learning outcomes – as proposed in the HEI's statement – in order to put the related qualification profile more clearly for

potential stakeholders. Integrate the specialisation-related learning outcomes in the Diploma Supplement.

For the Master programmes Mechatronics and Sensor Systems Technology and Computational Engineering

A 4. (ASIIN 2.1) Adapt the block-teaching structure in such manner that students have sufficient time to better grasp the course material.

Recommendations

For all degree programmes

E 1. (ASIIN 2.1) It is recommended to strengthen the efforts in increasing the number of scholarships/stipends in order to attract more students and raise both the mobility of students and the international visibility of the programmes.

E 2. (ASIIN 2.2) It is recommended to improve on the regular workload monitoring and adapt the ECTS distribution or the module content, if necessary.

E 3. (ASIIN 2.4) It is recommended to particularly ensure the proper availability of existing and announced student services for international students.

E 4. (ASIIN 6) It is recommended to further implement and develop the quality assurance system in place. In particular, the feedback loop of the module/course evaluations should be closed consequently ensuring that the students' response is effectively looked after.

For the Master programmes Mechatronic Systems and Sensor Technology and Computational Engineering

E 5. (ASIIN 1.4) It is recommended to more precisely communicate the expected knowledge, skills and competences of graduates with different Bachelor degree background (such as Electrical Engineering, Mechanical Engineering, Physics, Mathematics etc.).

For the Master programme Mechatronic Systems and Sensor Technology

E 6. (ASIIN 3) It is recommended to reflect comprehensively the contents and learning outcomes of the segmented modules in the planned assessment methods.

For the Master programme Computational Engineering

E 7. (ASIIN 1.1, 1.3) It is recommended to observe whether the measures taken to increase the application focus of the curriculum are fitting the demands of both the students and the labour market.

E 8. (ASIIN 4.3) It is strongly recommended to either move the programme to the new campus or through other appropriate means provide a learning environment fitting the students' needs in terms of teaching and learning as well as counselling and advice.

I Fulfilment of Requirements (03.12.2020)

Analysis of the peers and the Technical Committee (13.11.2020)

Requirements

For all degree programmes

A 1. (ASIIN 3) Ensure that qualified staff is available during the (final) examinations so that exam-related questions of students could be addressed properly.

Initial Treatment	
Peers	Fulfilled Vote: Justification: The regulations have been adapted to ensure the fulfillment of this requirement.
TC 02	fulfilled Vote: unanimous Justification: The technical committee follows the decision of the peers.

A 2. (ASIIN 5.2) Provide a programme-specific Diploma Supplement in line with the recommendation of the European Commission detailing the relevant features of the respective programme including the structure, intended learning outcomes and content as well as the individual achievements. In addition, the Diploma Supplement or Transcript of Record must contain statistical information about the overall grade distribution in order to enable an assessment of the individual performance.

Initial Treatment	
Peers	Fulfilled Vote: Justification: Diploma supplements have been provided by VGU
TC 02	fulfilled Vote: unanimous Justification: The technical committee follows the decision of the peers.

For the Bachelor's programme Electrical and Computer Engineering

A 3. (ASIIN 1.1) Detail the track-related programme learning outcomes – as proposed in the HEI's statement – in order to put the related qualification profile more clearly for potential stakeholders. Integrate the specialisation-related learning outcomes in the Diploma Supplement.

Initial Treatment	
Peers	Fulfilled Vote: Justification: The diploma supplements provided by VGU have been revised accordingly.
TC 02	fulfilled Vote: unanimous Justification: The technical committee follows the decision of the peers.

For the Master's programme Mechatronics and Sensor Systems Technology and Computational Engineering

A 4. (ASIIN 2.1) Adapt the block-teaching structure in such manner that students have sufficient time to better grasp the course material.

Initial Treatment	
Peers	Fulfilled Vote: Justification: Due to the block teaching structure, this requirement can only be partly fulfilled. Even if the students now have more time for preparation, the contents are presented in a very short time. As long as lecturers from Germany fly to Vietnam (Flying Faculty) this requirement cannot be completely fulfilled. Yet, since additional time for lecture and exam preparation is provided to the students, the peers consider this requirement to be fulfilled.
TC 02	fulfilled Vote: unanimous Justification: The technical committee follows the decision of the peers.

Decision of the Accreditation Commission (03.12.2020)

Degree programme	ASIIN-label	Subject-specific label	Accreditation until max.
Ba Electrical and Computer Engineering	All requirements fulfilled	/	30.09.2025
Ma Mechatronics and Sensor Systems Technology	All requirements fulfilled	/	30.09.2025
Ma Computational Engineering	All requirements fulfilled	/	30.09.2025

J Appendix: Programme Learning Outcomes and Curricula

According to the ECE Program Profile (Appendix A1), the Bachelor degree programme Electrical and Computer Engineering leads to the following **objectives** and **learning outcomes (intended qualifications profile)**:

F	COMPLETE LIST OF PROGRAMME LEARNING OUTCOMES
	1. Apply appropriate mathematical, science and core engineering methods to identify, formulate and solve electrical and computer engineering related problems; 2. Use conventional software and hardware tools and equipment to design and conduct experiments, test and evaluate analogue and digital systems, as well as to analyze and interpret data; 3. Analyze, design, program, develop and evaluate complex electrical, electronic systems, automation systems, embedded systems, power systems, communication systems to meet desired requirements in terms of general quality attributes and possible trade-offs presented within the given problem; 4. Retrieve and analyze information from different sources, including information retrieval through databases and online computer searches; 5. Demonstrate competency in English and Vietnamese oral and written communication skills, as well as in the use of relevant computing technologies and modern engineering tools necessary for engineering practice; 6. Develop deeper understanding of a certain disciplinary area in electrical and computer engineering; 7. Prepare high quality engineering documents and present a clear and coherent presentation of these to a range of technical and nontechnical audiences; 8. Function professionally in a globally competitive world, and to work as members of a team; 9. Work collaboratively in multi-disciplinary teams to plan and execute project work or research in the electrical, electronics and computer engineering disciplines; 10. Understand ethical principles and their role in the engineering profession; committed to ethical action and engaged in life-long learning to remain effective members of their communities; have the skills and attitudes to be responsible and thoughtful contributors to society, economy and ecology.

The following **curriculum** is presented:

J Appendix: Programme Learning Outcomes and Curricula

Table 2. Electrical & Computer Engineering Program, Major Automation Technology (AT)							ECTS
Sem. 1	61ECE101 Exploring Engineering	61ECE102 English for Engineering	61ECE103* German 1	61ECE104* German 2	61ECE105* German 3	61ECE106* German 4	30
Sem. 2	61ECE107 Calculus	61ECE108 Linear Algebra	61ECE109 Physics 1	61ECE110 Engineering Design	61ECE111 Introduction to Programming	61ECE112 Electric Circuits	30
Sem. 3	61ECE201 Physics 2	61ECE202 Electrical Measurement and Instrumentation	61ECE203 Advanced Engineering Mathematics	61ECE204 Digital System Design	61ECE205 Analog Signals and Systems	61ECE206 Object-Oriented Programming	30
Sem. 4	61ECE207 Electronics	61ECE208 Electromagnetics	61ECE209 Digital Signal Processing	61ECE211 Microcontroller	61ECE210 Control Engineering	61ECE212 Fundamentals of Power Engineering	30
Sem. 5	61ECE301 Electric Machines	61ECE304 Industrial Sensors & Actuators	61ECE305 Smart Building	61ECE306 Smart Systems in Automation	61ECE302 Machine Learning	61ECE303 Computer Networks	30
Sem. 6	61ECE318 Robotics & Autonomous Systems	61ECE316 Industrial Automation	61ECE319 Industrial Networking	61ECE317 Embedded Intelligent Systems	61ECE320 Drives in Automation	61ECE329 Technical Writing	30
Sem. 7	61ECE401 Internship						30
Sem. 8	61ECE402 Industrial Business Management	61ECE498 Senior Project		61ECE499 Bachelor-Thesis with Colloquium			30

*Technically, the students must obtain IELTS 6.0 before starting the program. In the non-standard case, the students who obtain IETLS 5.0 to lower than 6.0 will study IELTS in these 4 modules instead of German; and will study German extra-curricularly later, obtain a A2 level to fulfill the credits of these 4 modules.

Table 3. Electrical & Computer Engineering Program, Major Energy Technology (ET)							ECTS
Sem. 1	61ECE101 Exploring Engineering	61ECE102 English for Engineering	61ECE103* German 1	61ECE104* German 2	61ECE105* German 3	61ECE106* German 4	30
Sem. 2	61ECE107 Calculus	61ECE108 Linear Algebra	61ECE109 Physics 1	61ECE110 Engineering Design	61ECE111 Introduction to Programming	61ECE112 Electric Circuits	30
Sem. 3	61ECE201 Physics 2	61ECE202 Electrical Measurement and Instrumentation	61ECE203 Advanced Engineering Mathematics	61ECE204 Digital System Design	61ECE205 Analog Signals and Systems	61ECE206 Object-Oriented Programming	30
Sem. 4	61ECE207 Electronics	61ECE208 Electromagnetics	61ECE209 Digital Signal Processing	61ECE211 Microcontroller	61ECE210 Control Engineering	61ECE213 Electric Power Grids	30
Sem. 5	61ECE307 Energy Conversion Systems	61ECE308 Smart Grids	61ECE309 Power System Analysis	61ECE310 Energy Policy	61ECE311 Renewable Energy Systems 1	61ECE301 Electric Machines	30
Sem. 6	61ECE321 Renewable Energy System 2	61ECE316 Industrial Automation	61ECE322 High-voltage Engineering	61ECE323 Electric Motors & Drives	61ECE324 Power Electronics	61ECE329 Technical Writing	30
Sem. 7	61ECE401 Internship						30
Sem. 8	61ECE402 Industrial Business Management	61ECE498 Senior Project		61ECE499 Bachelor-Thesis with Colloquium			30

Table 4. Electrical & Computer Engineering Program, Major Information & Communications Technology (ICT)							ECTS
Sem. 1	61ECE101 Exploring Engineering	61ECE102 English for Engineering	61ECE103* German 1	61ECE104* German 2	61ECE105* German 3	61ECE106* German 4	30
Sem. 2	61ECE107 Calculus	61ECE108 Linear Algebra	61ECE109 Physics 1	61ECE110 Engineering Design	61ECE111 Introduction to Programming	61ECE112 Electric Circuits	30
Sem. 3	61ECE201 Physics 2	61ECE202 Electrical Measurement and Instrumentation	61ECE203 Advanced Engineering Mathematics	61ECE204 Digital System Design	61ECE205 Analog Signals and Systems	61ECE206 Object-Oriented Programming	30
Sem. 4	61ECE207 Electronics	61ECE208 Electromagnetics	61ECE209 Digital Signal Processing	61ECE211 Microcontroller	61ECE210 Control Engineering	61ECE214 Communications Engineering	30
Sem. 5	61ECE303 Computer Networks	61ECE312 Digital Signals & Systems	61ECE313 Electronic Circuits	61ECE314 Mobile Communications	61ECE315 IT Security	61ECE302 Machine Learning	30
Sem. 6	61ECE325 Operating Systems	61ECE326 RF Engineering	61ECE317 Embedded Intelligent Systems	61ECE327 Communication Networks	61ECE328 Digital Routing	61ECE329 Technical Writing	30
Sem. 7	61ECE401 Internship						30
Sem. 8	61ECE402 Industrial Business Management	61ECE498 Senior Project		61ECE499 Bachelor-Thesis with Colloquium			30

According to Program Profile (Appendix A1), the Master degree programme Mechatronics and Sensor Systems Technology leads to the following **objectives** and **learning outcomes (intended qualifications profile)**:

F	COMPLETE LIST OF PROGRAMME LEARNING OUTCOMES
	On the successful completion of the MSST program, the graduates will be able to: • Identify, formulate, and develop scientific models for mechatronics and sensor system technology based on theoretical insights and fundamental techniques; • Conduct feasibility studies for using mechatronics & sensor systems for solving assistive technology applications; • Classify and synthesize currently available methods, algorithms, and software to tackle new scientific and engineering problems in mechatronics & sensor system technology; • Design and build mechatronic & sensor systems; • Perform simulations with given methods using commercial software (ANSYS, Mathematica, LTSpice, MATLAB, Python, etc.), or self-developed codes, or both; • Comprehend, interpret, verify and validate simulation results; also utilize simulation results in subsequent calculations in the context of complex problems such as design optimizations related sensor technology; • Develop new mechanism related sensors and integrate them into robotic systems in the field of production, medical or environmental engineering; • Develop progress related automation systems using sensor technology; • Communicate orally, graphically, and in written form in English language; • Work independently on scientific topics and/or industrial projects; • Coordinate decisions between team members and moderate a discussion effectively.

The following **curriculum** is presented:

Table 1. Curriculum of MST program

Semester	Module Code	Module Name	Subject	CPs	Exam
1	61MST501	Physical Chemical Principles and Sensor	Physical Chemistry	3	PL
			Fundamentals of Physical Sensor	3	SL
	61MST502	Sensor Lab	Analog Electronic Lab	3	PL
			Digital Electronic Lab	3	SL
	61MST503	Technology Materials	Smart Materials	3	PL
			Technology of Sensors	3	SL
	61MST504	Programming	Advanced Programming	3	PL
			Digital Signal Processing	3	SL
	61MST505	Advanced Dynamics Control	Advanced Control Systems	3	PL
			Modelling, Simulation, Verification	3	SL
2	61MST506	Automotive Sensor Applications	Bus Systems	3	PL
			Automotive Sensors & Safety & Reliability	3	SL
	61MST507	Advanced Simulation	Numerical Simulation	3	PL
			Application of FEM Technology	3	SL
	61MST508	Embedded Systems	Microcontroller	3	PL
			Microcontroller Lab	3	SL
	61MST509	Automation	Automation System	3	PL
			Automation Lab	3	SL
	61MST5010	Elective I (Student choose one module Robotics or Fluid Mechanics and Heat Transfer) — Robotics	Fundamental of Robotics	3	PL
			Advanced Robotics	3	SL
		Fluid Mechanics and Heat Transfer	Fluid Mechanics	3	SL
			Heat Transfer	3	PL
3	61MST601	Environment Sensor Technology	Environmental Process Technology	3	PL
			Environmental Lab	3	SL
	61MST602	Advanced System Engineering	Modern Intelligent Control	3	PL
			Control Lab	3	SL
	61MST603	Management	Project Management	3	PL
			Research Methodology	3	SL
	61MST604	Scientific Project	Industry Project	6	PL
	61MST605	Elective II (Student choose 2 subjects out of three)	Image Processing	3	PL
			System Identification	3	SL
			Digital Control Systems	3	PL
4	61MST606	Thesis		27	PL
	61MST607	Final Examination		3	PL

According to Module Handbook, the Master degree programme Computational Engineering leads to the following **objectives** and **learning outcomes (intended qualifications profile)**:

2. Program-level intended learning outcomes

No.	Intended learning outcomes
LO1	Recognize the wide-ranging and far-reaching roles of computational science and engineering in education, academic research, and industry—as well as in society in general.
LO2	Recognize and categorize standard scientific and engineering problems into relevant branches (solid mechanics, fluid mechanics, thermodynamics, material, hybrids of multiple branches, etc.) and, subsequently, specific types (particular flow regime in fluid mechanics, elastic/plastic/fracture in solid mechanics, etc.) in the framework of applied mechanics.
LO3	Identify suitable physical and mathematical models, then construct solution approaches using currently available computational tools, taking into account scientific and technical constraints and—if applicable—other constraints such as social, ecological, economic.
LO4	Execute computations by either using available solutions (commercial or open source) or developing new computer programs—or a combination of both; manage and analyze the resultant datasets.
LO5	Assess the reliability of computation results obtained through a particular computational solution approach; then determine appropriate remedies for shortcomings that have been identified.
LO6	Deconstruct a complex scientific/engineering problem into constituent components and, subsequently, identify ones that require computational approaches; integrate computational results with those from other approaches to form a comprehensive and coherent view—including the scientific/technical contexts and constraints, and social/economic/ecological/… aspects if applicable.
LO7	Comprehend further advanced scientific models and computational tools; develop solution approaches anew if those currently available are deemed inadequate.
LO8	Conduct independent scientific research and prepare themselves for follow-on doctoral training.
LO9	Deploy the following transferable skills: • Effective verbal and written communication in the English language. • Working ethically and efficiently, either as an individual or member of a team. • Competent skills in solving problem and doing research, with the assistance of modern online electronic resources.

The following **curriculum** is presented:

3. Program structure and curriculum

Sem.	Code	Title	ECTS	Cat.
1	61COM501	Introduction to Computational Science and Engineering	6	C
	61COM502	Mathematical Aspects of Differential Equations and Numerical Mathematics	6	C
	61COM503	Mechanics of Solids	6	C
	61COM504	Thermo-Fluid Dynamics	6	C
	61GPE***	Engineering Design and CAD Modeling	6	E
	61COM507	Variational Calculus and Tensor Analysis	6	E
2	61COM505	Computational Thermo-Fluid Dynamics	6	C
	61COM506	Finite Element Methods in Linear Structural Mechanics	6	C
	61MST507	Application of FEM Technology	3	E
	61COM508	Boundary Element Methods	4	E
	61COM509	Computational Dynamics	6	E
	61COM510	Continuum Mechanics	6	E
	61COM511	Design Optimization	6	E
	61COM512	Dynamics and Adaptronics	6	E
	61COM513	Material Modeling and Simulation	6	E
	61COM514	Numerical Mathematics and Stochastics	6	E
	61COM515	Technical Communication for Academic Study	6	E
3	61COM601	Modern Programming Concepts in Engineering	6	C
	61COM602	Verification, Validation, and Uncertainty Quantification	6	E
	61COM603	Advanced Control Methods for Adaptive Mechanical Systems	6	E
	61COM604	Advanced Finite Element Methods	6	E
	61COM605	Computational and Variational Methods for Inverse Problems	6	E
	61COM606	Computational Plasticity	4	E
	61COM607	Computational Wind Engineering	3	E
	61COM608	Discontinuous Galerkin Method	6	E
	61COM609	Dynamics of Structures	6	E
	61COM610	Fracture Mechanics	6	E
	61COM611	Meshfree Particle Methods	6	E
	61COM612	Parallel Computing	6	E
	61COM697	Case Study	6	E
4	**61COM699**	**Master's Thesis**	**30**	**M**