

**Accreditation Report**  
**German University of Technology in Oman**

**“Mechanical Engineering” (B.Eng.), “Environmental Engineering” (B.Eng.),  
“Process Engineering” (B.Eng.)**

**I Procedure**

**First accreditation on:** 29 September 2015 through: ACQUIN, until: 30 September 2020, extension of accreditation until 30 September 2021, after assessing the initial documents

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**Attendance by the ACQUIN Office:** Marion Moser

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## **Review Criteria**

On request of the German University of Technology (GUtech) in Oman and due to the affiliation of the study programmes with RWTH Aachen University, the accreditation procedure is based on the criteria of the specimen decree (Resolution of the Standing Conference of the Ministers of Education and Cultural Affairs of the Länder in the Federal Republic of Germany of December 7, 2017), which integrates the ESG (see annex mapping grid). Some criteria of the specimen decree are not relevant for the study programmes (see also annex). Each chapter refers to the corresponding criteria of the specimen decree. Paragraphs without corresponding criterion in the specimen decree refer to the relevant ESG standard.

### **1 Short profile of the HEI**

#### **German University of Technology in Oman**

The German University of Technology in Oman (GUtech) is a private university in Oman which was founded in 2007 with support of H.E. Abdullah bin Mohammed Al Salmi, the Omani Minister of Endowments and Religious Affairs, and the German Academic Exchange Service (Deutscher Akademischer Austauschdienst, DAAD). GUtech is associated with RWTH Aachen University and is a non-profit organisation but needs to cover its own expenses. For all study programmes tuition fees are therefore mandatory.

The university consists of the following four faculties: the Faculty of Business and Economics with the Department of Logistics, Tourism and Service Management, the Faculty of Engineering and Computer Science with the Department of Computer Science and the Department of Engineering, the Faculty of Science with the Department of Applied GeoScience, and the Faculty of Urban Planning and Architectural Design with the Department of Urban Planning and Architecture. In addition, the GUBridge-Foundation is the responsible Department for the offered Foundation Programme, equipping students with the necessary (language skills as well as and subject relevant basic skills for the chosen Bachelor programme).

GUtech provides programmes of study and research that enable innovation and are aligned with the German university model. The University aspires to achieve this by encouraging the exchange of people, knowledge and ideas between the Sultanate of Oman and Germany, thereby strengthening the intercultural understanding between both countries and beyond. Meanwhile over 2351 students are studying at GUtech.

In total, ten Bachelor and five Master study programmes are offered. The teaching language at GUtech is English; additional German classes provide the students with a basic knowledge in preparation of the intercultural student exchange with Germany. In all programmes GUtech implements the

European Credit Transfer System (ECTS) to facilitate international exchange and academic recognition.

## **2 Short profiles of the study programmes**

The three Bachelor programmes “Mechanical Engineering” (B.Eng., ME), “Process Engineering” (B.Eng., PE) and “Environmental Engineering” (B.Eng., EE) are offered by the Department of Engineering. The first two programmes were introduced in 2011, the latter in 2013. The study programmes’ duration is 8 semesters (240 ECTS credits). Each winter semester, up to 120 applicants can enrol for all three degree programmes together. The number of students has increased constantly in recent years and currently an average of 140 first-year students are enrolled each year. The PE programme is the most popular programme, followed by ME and EE.

To ensure the quality of its study programmes, GUtech involves international experts in the development process. The study programmes offered by the GUtech Department of Engineering are based on the expertise of the RWTH Aachen Faculty of Mechanical Engineering.

The study programmes are taught in English, including written and oral tests, seminar papers, and the Bachelors’ and Masters’ thesis. GUtech is the only private HEI in Oman asking for an IELTS score of at least 6.0 to enter a bachelor programme. Due to the quality of the local high school education system, most students cannot immediately enter the Bachelor programmes but first complete the GU Bridge Foundation Programme.

For the programmes “Mechanical Engineering” (B.Eng.), “Process Engineering” (B.Eng.) and “Environmental Engineering” (B.Eng.) a tuition fee of 2940 Omani Rial (OMR) for Omanis and 3900 OMR for non-Omanis is required.

## II Formal criteria

### 1 Structure, duration and profile of the study programmes (§§ 3 - 4 specimen decree)

#### Documentation

The Bachelor programmes “Mechanical Engineering” (B.Eng.), “Environmental Engineering” (B.Eng.) and “Mechanical Engineering” (B.Eng.) are all full-time programmes with a standard duration of eight semesters in which students achieve 240 ECTS credits.

In all three Bachelor programmes, students are required to write a Bachelor thesis in order to prove that they can work independently on a specific topic according to scientific methods within a given period of time. The Bachelor thesis is credited with 12 ECTS, the Bachelor colloquium with three ECTS credits.

#### Assessment/Conclusion

The criterion is fulfilled.

### 2 Admission requirements and enrolment (§ 5 specimen decree)

#### Documentation

A direct admission to the undergraduate programmes at GUTech is possible with following certificates:

- General Education Diploma of the Sultanate of Oman (GED), pass in GUTech’s mathematics direct entry test and in the Internet and Computing Core Certification test at GUTech
- International Baccalaureate Certificate and Diploma (A Levels) with at least 24 points, pass in both physics and chemistry at grade 10 level, 3 HL or 4 SL Mathematics
- Indian High School Certificate (Advanced Placement) or equivalent
- General Certificate of Education (4 AS and 2 A level subjects, at least C in AS-level mathematics and in GCSE Physics and Chemistry)
- Central Board of Secondary Education, pass grade 12 with a minimum 70 % overall marks

In addition, a good level of proficiency in English (IELTS score of at least 6.0 or an equivalent TOEFL score) is required.

If these requirements are not met, students usually enter the pre-university “Foundation Programme”.

The entrance test and the language courses in the “Foundation Programme” ensure that the students have sufficient language skills in order for them to attain an IELTS score of 6.0 or above needed for enrolment in their chosen GUTech degree programme.

### **Assessment/Conclusion**

In general, the admission requirements are adequate for all three programmes, the selection procedures are well elaborated and guarantee that prospective students have acquired the relevant basic knowledge as well as study skills.

The criterion is fulfilled.

## **3 Degree (§ 6 specimen decree)**

### **Documentation**

Upon successful completion of the study programmes the GUTech awards the degree Bachelor of Engineering. The awarded degree is appropriate due to the disciplinary orientation of the study programmes.

### **Assessment/Conclusion**

The criterion is fulfilled.

## **4 Modularisation and Credit points system (§§ 7 - 8 specimen decree)**

### **Documentation**

In all three study programmes the ECTS is applied. The course (module) size in all three programmes shows a range between two and seven ECTS credits. In some cases, GUTech awards less than 5 ECTS credits reasoning that a combination into larger units would not be appropriate due to the course content. According to the Academic Regulations (2.4) one ECTS is equivalent to 25 hours, typically students achieve between 27 – 34 ECTS credits per semester.

The course catalogue provides information on semester, learning outcomes, topics/content, prerequisites, forms of learning, distribution of workload, literature, forms of assessment and weighting.

### **Assessment/Conclusion.**

The criterion is fulfilled.

## 5 Recognition and crediting

### Documentation

The recognition of credits of other higher education institutions and of prior experience are regulated in the “Academic Regulations”. Students coming from other higher education institutions and from other programmes can have their relevant credits recognized. The procedures related to a credit transfer are described in a “Credit Transfer Policy”. In order to verify the equivalence of qualifications, GUTech uses the database of the German “Zentralstelle für Ausländisches Bildungswesen” as a guideline.

### Assessment/Conclusion

The criterion is fulfilled.





### **III Content specific criteria/academic criteria**

#### **1 Focus of the review**

During the on-site visit, which was conducted virtually due to the Covid-19 pandemic, discussions were held with lecturers, head of the programmes, students, and the university management. In addition, the university presented a short video on its equipment.

During the on-site visit, the expert group discussed in particular the development of the Bachelor programmes since the last accreditation and changes planned in the near future.

#### **2 Content specific criteria/academic criteria**

##### **2.1 Overarching aspects**

##### **2.1.1 Qualification objectives (§ 11 specimen decree)**

###### **Documentation**

The overarching aim of all three Bachelor programmes is to provide students with comprehensive engineering knowledge and skills so that they can meet the requirements of the labour market as well-trained engineers after completing their studies. The subject-specific knowledge and skills include also problem-solving skills. Students should be able to identify and analyse problems, to develop and to implement corresponding solutions. In addition, all GUtech graduates are also expected to develop soft skills and personal competencies like ethical and social responsibility, self-management, critical and creative thinking, IT-competencies, individual and teamwork skills, as well as communication and language skills, capacity for lifelong learning, language skills, and the ability for interdisciplinary cooperation.

###### **Assessment**

The general objectives formulated by GUtech can be summarized as:

- Offering attractive study programmes of high quality for high school graduates
- Meeting the demands of the local and international industry regarding the qualification level of the graduates

The overarching general objectives are assessed positively by the expert group.

The university regards the promotion of the students' personal development in addition to the teaching of subject-specific competences as one of its tasks. The university emphasises the above-mentioned aspects as important and includes them in various forms across the disciplines.

GUtech's objective is to train not only engineers but also individuals who meet the intellectual, cultural, and ethical requirements of the state and society. The ability to research and analyse important information and to use it meaningfully for active participation in social processes is also regarded as an overriding objective. In particular, the promotion of communication and teamwork skills are well integrated into the courses, e. g. through group work, laboratory courses and student projects. Moreover, mandatory "Life Skills" (LS) courses are embedded in the curriculum in the first six semesters. These additional courses are a useful supplement to the subject-specific modules.

## **Conclusion**

The criterion is fulfilled.

### **2.1.2 Curriculum (§ 12 (1) sentences 1 to 3 and 5 specimen decree)**

All three study programmes are completely modularized. The programmes have a regular study period of eight semesters where 240 ECTS credits (which is equal to 600 Omani credits) are obtained. The first part of these programmes aims at teaching fundamental tools and general skills of engineering. The programmes hence share a common basic structure. Programme-specific courses in the higher semesters ensure that the programme-related qualification objectives are achieved.

The relevant engineering fundamentals are taught together in a total of the following 24 modules: four mathematics courses, two courses each in chemistry, physics and mechanics, three courses in thermodynamics (containing one lab course), and one of the following modules: "Programming for Engineering", "Engineering Drawing", "Engineering Principles and Calculation", "Electrical and Electronic Engineering", "Environmental Engineering", "Materials Science I", "Fluid Dynamics", "Measurement Techniques Laboratory", "Business Engineering" and "Research Methods". In addition, students must take four "Project Work" courses with a total of 16 ECTS credits in each programme and six LS courses with 24 ECTS credits.

The first four semesters are almost identical in the programmes (with one programme specific course in the 4<sup>th</sup> semester); from the 4<sup>th</sup> semester onwards, the programme specific courses are taught. In the last semester, the students write the Bachelor thesis (12 ECTS credits) and discuss the topic of the thesis and its results in a colloquium (3 ECTS credits). An internship with 15 ECTS credits has to be carried out in the last semester.

## Assessment

Generally, all modules are adequately designed. The three Bachelor programmes are characterised by the use of synergy effects. In the commonly used 24 modules with a total of 117 ECTS credits students acquire a good mathematical, scientific, and engineering basic knowledge, on which the respective subject-specific contents are then taught. In the programme-specific modules, students acquire further 69 ECTS credits. In total 186 ECTS points are acquired in the engineering science courses, which is appropriate for an engineering Bachelor programme. Positively assessed is the course “Research Methods” which supports students in preparing their Bachelor thesis.

The ECTS credits adequately represent the content and workload of the students in the individual modules. According to the exemplary study plans the ECTS credits are not always distributed evenly over the semesters. However, since the students have a certain flexibility when taking some of the LS courses (excluding the German courses), they have the possibility to change their workload slightly over the semesters.

Some modules show a workload of less than five ECTS credits. These are usually introductory or laboratory modules. According to the assessment of the expert group, these modules are meaningfully designed and a formation of larger units or combination with other courses does not make sense for reasons of content and didactics. Course descriptions are well elaborated and provide valuable information for students.

A sufficient variety of teaching methods is used in the courses, such as lectures, project work, demonstrations, laboratory work and tutorials. This represents an adequate variety of teaching methods that are appropriate with regard to the qualification objectives and the content of the courses. Due to the pandemic situation, blended/online learning formats were also used. According to the expert group, it should be analysed how digital teaching formats can also be used in the study programmes in the future. This could be of particular interest for courses taught by external lecturers.

The study programmes are on one hand organised to ensure a close contact of students and teaching staff, on the other hand the students are expected to arrange courses, learning groups, internships, exchange programmes on their own, so that the Bachelor programmes also enforces the personality development of the students to self-determined grown-up characters which will find their responsible position in international society.

The practical elements (laboratory courses) as well as practical courses such as “Project Work” are positively assessed, as theoretical knowledge is immediately consolidated and deepened through practical application in the laboratories, which prepares the students well for their later professional life.

Especially the laboratory practicals integrated in the courses are considered important for the programmes. They promote the understanding of engineering work and support the achievement of the

qualification objectives. However, the hours of laboratory practicals are not yet mentioned in the course descriptions. A clear indication of the number of hours of laboratory practicals would be helpful for students and make the labs and other practical elements in the programmes more visible.

The obligatory internship with a duration of eight weeks provides an excellent opportunity for getting acquainted with practical problems and solutions in the industry. The academic staff maintain good contacts in the regional labour market. Students are required to write an internship report which will be evaluated at the end. The students must organize the internships by themselves, but GUTech supports them if necessary. The students are overall very satisfied with the support of GUTech and their internship. The expert group learned that it is easier for students to find internship placements for a duration of five to six weeks than for a longer period, as companies do not always have the capacity for long-term internships.

The peer group welcomes the integration of the internship into the curricula, which on the one hand allows the students to apply the acquired knowledge and competences directly in practice and get insight into practical work, and on the other hand enables them to get into contact with future employers.

During the site visit, the expert group noticed that GUTech has discussed the study programmes very intensively as part of the reaccreditation process and is now planning further changes in 2021/2022, which include the following aspects for all three study programmes:

- Renaming of modules (e. g. “Chemistry 1” to “Chemistry 1: Chemistry for Engineers”) and adaptation of contents
- Shifting modules to another semester
- Modification of ECTS credits
- Removing modules and partially integrating contents into other modules
- Introduction of elective courses
- Reduction of the ECTS credits of the internship from 15 to 10 ECTS credits, at the same time, introduction of the elective course "Extended Internship" with 5 ECTS credits.

These future changes were discussed with the expert group; in addition to general comments, there are also programme-specific comments on the changes, which are elaborated in the following chapters.

Overall, the expert group regards the proposed changes for 2021/2022 as reasonable and welcomes the integration of electives in the curricula. Students now have the possibility to select modules specifically according to their interests, which will further promote student-centred learning and teaching. However, discussions with the heads of the study programmes and students left some uncertainty

as to whether the total workload for the modules is always consistently reflected in the ECTS credits. This particularly applies when ECTS points and/or contents of modules are changed. Here special care should be taken in the new proposed curricula to adjust the course content accordingly, if ECTS credits are changed. After the introduction of the new curriculum, the workload of the students should be closely monitored to prevent overload. The workload of the students is not yet evenly distributed over the semesters; a more even distribution with 30 credits/semester should be strived for.

The deletion of the module “Project Work IV” and the reduction of the ECTS for the internship is, in the opinion of the expert group, somewhat diametrical to the desired practice and professional experience for the students. The extension of the module “Project Work III” from 4 to 5 ECTS credits will probably not compensate for this in total. The expert group can follow the reduction of ECTS credits for the internship, as it is apparently difficult to find longer-term internships. In this case, this reduction is reasonable.

After the implementation of the new curriculum, it should be evaluated to what extent the reduction of credits for the “Project Work” courses and the internship influences the practical and professional competences of the students.

## **Conclusion**

The criterion is fulfilled.

The peer group gives the following recommendations:

- The module descriptions should specify the number of hours spent on laboratory practicals.

Recommendations specific for the new curricula of the three Bachelor programmes:

- When reducing the ECTS credits of modules in the new curricula, to the GUTech should ensure that the contents and requirements in the modules are changed accordingly.
- The workload of students / ECTS credits should be distributed more evenly during the course of studies. A workload of 30 ECTS per semester would be desirable.

## **2.2 Mechanical Engineering**

### **2.2.1 Objectives of the study programme (§ 11 specimen decree)**

#### **Documentation**

GUTech has defined for its study programme “Mechanical Engineering” (B.Eng.) the following objectives:

“The aim of the Bachelor of Engineering in Mechanical Engineering is to develop the knowledge and competencies required to meet the demands of the profession of Mechanical Engineering in the Sultanate of Oman and the region. More specifically, graduates of the programme will have developed attributes and skills as described below, which will allow them to progress to the status of skilled engineers or to enrol in a postgraduate programme in the field of Mechanical Engineering.

In addition to the University’s general graduate attributes and skills, graduates from the Bachelor of Engineering in Mechanical Engineering will also have developed the following attributes and skills that will allow them to carry out successfully the duties of a Mechanical Engineer:

- Knowledge and understanding of engineering – Graduates will have gained a broad and sound knowledge in mathematics, science, and engineering, enabling them to understand the phenomena characteristic to mechanical engineering. The graduates will have also gained an understanding of the broader multi-disciplinary context of engineering sciences.
- Engineering analysis – Graduates will be able to identify, formulate and solve problems particular to mechanical engineering based on the application of established scientific methods; graduates will also be able to analyse products, processes and methods used in their discipline based on scientific facts; they will know how to select suitable methods of analysing, modelling, simulating, and optimising and apply them with a high degree of competence.
- Engineering design – Graduates will have developed the ability to design machinery, devices, programs, or processes according to specified requirements; They will have developed a practically-oriented understanding of design methods and the ability to apply them in a competent manner.
- Investigations and assessment – Graduates will be able to carry out literature research and know how to use data bases and other sources of information for their work; they will have developed the skills to plan and carry out suitable experiments, interpret the data and draw suitable conclusions.
- Engineering practice – Graduates will have developed the competencies to transfer new findings in engineering and natural sciences to industrial and commercial production under consideration of economic, ecological and safety requirements; Graduates will be able to plan, control and monitor processes and to develop and operate systems and equipment; They will also be able to independently consolidate the knowledge gained and will be aware of the non-technical effects of engineering activities.”

### **Assessment**

The objective of the study programme “Mechanical Engineering” is mainly focussed to meet the demands on mechanical engineers in the Sultanate of Oman and the region. The programme itself

is additionally adjusted to compete successfully with similar study programmes of other universities in the Sultanate and to meet the guidelines of the government.

It is focussed on the transfer of competencies in manufacturing, machine construction & development and business management. This includes in particular competences in:

- Basic multi-disciplinary engineering understanding with education in mathematics, science and engineering
- Analytic solving of problems using scientific methods with a high degree of competence
- Designing machinery, devices, and programmes according to the equivalent requirements
- Investigating complex problems by using adequate information sources, executing appropriate experiments and analyse data correctly
- Practicing as graduates according to economic, ecological and safety standards and be aware of the non-engineering effects of their professional activities

According to the assessment of the expert group, the defined objectives are well formulated and after graduation, the students are educated and qualified to either work directly as professionals in industry or administration or may continue with a master program.

The objectives are aligned with the requirements for engineers in the region and the degree programme is designed to meet these requirements. In addition, GUtech's affiliation with RWTH Aachen University strengthens the international orientation of the degree programme and thus the competitiveness of graduates in the international labour market.

## **Conclusion**

The criterion is fulfilled.

### **2.2.2 Concept of the study programme and its implementation/Curriculum (§ 12 (1) sentences 1 to 3 and 5 specimen decree)**

#### **Documentation**

In addition to the above-mentioned common modules, students must complete the following eleven modules in the Bachelor programme: „Introduction to CAD“, „Materials Science I and II“, „Machine Design I“, „Heat and Mass Transfer“, „Control and Automation“, „Simulation Techniques“, „Production Technology“, „Machine Tools“ and „Control and Automation Laboratory“. Main changes since the last accreditation have been the shift of modules to a semester above or below and in one module the adaption of ECTS credits. The further proposed changes for 2021 concern the introduction of the two new modules "Introduction to Mechatronics and Embedded System" and "Mechanical

Vibrations" (as a replacement for "Machine Tools"), and an adjustment of the content in the module "Heat Transfer, now also with a new name.

### **Assessment**

In the experts' view, the study programme is very thoroughly planned and basically conveys all important contents, competences and methods that are necessary to achieve the qualification objectives. The curriculum covers the basics of mechanical engineering comprehensively. A profound basis is offered in mathematics, natural sciences, mechanics, and material sciences as well as in further subjects of mechanical engineering.

The study content and structure are balanced to settle a profound foundation in the relevant engineering basic skills, a parallel education in key qualifications and subsequent further and broader education in engineering sciences. The students gain application-based research skills which are adequate regarding a bachelor's degree in mechanical engineering. The programme is adjusted to the local requirements in mechanical engineering with an additional international orientation which may graduates make attractive for employers. The experience so far and the feedback of graduates' show, that a successful study programme enhances the chances to work as professional engineers in industry and administration. However, continuing with a Master study programme is also an option.

A concern in the education of mechanical engineers may be the minor representation of practical education (internship) of the prospective students in tooling, handcrafting, and machining before starting with the Bachelor programme. According to the view of the expert group, this should be part of the academic education before or during the first semesters of the programme, maybe during a summer break. The students should know the basics of manufacturing and assembly surfaces, fits, clearances, and machines as well as the use of corresponding tools before the students learn to design new machines. A fundamental understanding in the practical areas of mechanics may also contribute to a successful passing of the relevant study courses.

It was explained that there are several project courses where the students must build things on their own under guidance in the workshops. But this may differ from the understanding of a basic training in mechanical handcrafting. Additionally, the final internship at the end of the programme will be reduced from 15 ECTS credits to 10 ECTS credits which may additionally reduce practical experience in a study with a strong practical objective and content. And the course "Machine Tools" is planned to be removed in future, which additionally may weaken a practical reference of the study programme. Therefore, practical training and education should be considered with the appropriate relevance in the curriculum.

In general, the changes made to the programme so far in the context of its development are positive. The shifting of modules between semesters was made to ensure the required basic knowledge for the following modules.



The study programme was modified and improved according to the feedback from students, the labour market and the own experience of the lecturers (relocation of modules to other semesters, changes to the content of modules, such as the integration of AutoCAD or simulation with finite elements using ANSYS). The changes made so far, as well as the changes planned for the near future, demonstrate the expertise of the programme responsible. The changes in the programme are to be seen as a positive development.

However, the workload based on the ECTS credits is very high in certain semesters in the new proposed curriculum. For example, 35 credits in semester 4 will result in a workload of 54 h/week, based on 14 plus 2 weeks teaching and exams. There may be only a minor opportunity to shift credits, as other semesters are also very occupied. But perhaps the 2nd semester (27 credits) or the 6th and 7th semester (28 credits) can be used to move courses with low credits from semesters with higher workloads into these semesters.

The plan to remove the module “Chemistry II” from the new curriculum seems to be acceptable because other, more favourable, and more relevant courses are added, such as “Introduction to Mechatronics and Embedded Systems” and the new elective course “Process Safety”.

In general, the module “Life Science” and technical elective courses make the study programme attractive. The studies can hence be biased to individual interests of the students. However, to the GUTech should ensure that other content relevant to mechanical engineers continues to be represented in the curriculum. For example, "Machine Tools" should be replaced by the course "Mechanical Vibrations". In the experts' view, the machine tools course is certainly relevant to mechanical engineering studies. GUTech stated that this course is less relevant for the Omani labour market than in other countries such as Germany or Switzerland. The expert group can follow this argumentation to a certain extent, but GUTech should carefully observe the requirements of the labour market with regard to students' expertise and competences. However, GUTech should ensure that students acquire all the relevant competences for a mechanical engineer.

It can be summarized that curriculum was optimized since the last accreditation and will also be optimized further. Special focus should be placed on the distribution of the workload in the new curriculum, especially in the 3<sup>rd</sup> and 4<sup>th</sup> semester. It should be considered to shift courses to another semester for a more even workload distribution. Also, more attention should be paid to the practical, mechanical handcrafting education as a “natural” knowledge basis for a responsible mechanical engineer. Very positive and impressive is the amount and kinds of elective courses which are now offered to students.

Overall, the curriculum is very comprehensive and is positively evaluated. It gives students many opportunities for the individual configuration.

## Conclusion

The criterion is fulfilled.

### 2.3 Process Engineering

#### 2.3.1 Objectives of the study programme (§ 11 specimen decree)

##### Documentation

The aim of the Bachelor programme “Process Engineering” (B.Eng.) is to enable students to acquire knowledge and competencies required to meet the demands of the profession of Process Engineering in the Sultanate of Oman and the region. After graduation students should have developed attributes and skills, which will allow them to progress to the work successfully as an engineer or to enrol in a postgraduate programme in the field of Process Engineering.

According to the self-evaluation report of GUtech students will also have developed the following attributes and skills:

- Knowledge and understanding of Engineering – Graduates will have gained a broad and sound knowledge in mathematics, science, and engineering, enabling them to understand the phenomena characteristic to Process Engineering. The graduates will also have gained an understanding of the broader multi-disciplinary context of engineering sciences.
- Engineering analysis – Graduates will also be able to identify, formulate and solve problems particular to Process Engineering based on the application of established scientific methods; Graduates will also be able to analyse products, processes and methods used in their discipline based on scientific facts; They will know how to select suitable methods of analysing, modelling, simulating, and optimising and apply them with a high degree of competence.
- Engineering design – Graduates will have developed the ability to design machinery, devices, programs or processes according to specified requirements; They will have developed a practically-oriented understanding of design methods and the ability to apply them in a competent manner.
- Investigations and assessment – Graduates will also be able to carry out literature research and know how to use data bases and other sources of information for their work; they will have developed the skills to plan and carry out suitable experiments, interpret the data and draw suitable conclusions.
- Engineering practice – Graduates will have developed the competencies to transfer new findings in engineering and natural sciences to industrial and commercial production under

consideration of economic, ecological and safety requirements; graduates will be able to plan, control and monitor processes and to develop and operate systems and equipment; They will also be able to independently consolidate the knowledge gained and will be aware of the nontechnical effects of engineering activities.

## **Assessment**

The study programme “Process Engineering” (B.Eng.) is aimed at high-school graduates who aim to obtain a first academic degree at the bachelor’s level in the field of Process Engineering. The knowledge and competencies acquired are intended to qualify graduates for the needs of Omani industry. The knowledge and skills acquired in the programme are designed to enable graduates to meet the requirements of Omani industry. Core elements of the programme are the provision of technical and engineering knowledge and understanding, engineering analysis, design, and practice.

Students are enabled to obtain special skills for analysing and solving complex problems in the field of process engineering. They acquire the necessary scientific and engineering skills for their future professional experience. These objectives are well established within the programme and are very well reflected in the structure of the curriculum. The students are provided with a sound knowledge in mathematics, fundamentals of science, and engineering. During their studies, they are gradually introduced to scientific work in project works, the Bachelor thesis and a dedicated research methods course. This provides an excellent basis for independent, scientifically sound solutions to engineering problems in the field of process engineering and qualifies graduates for further studies master’s level.

Several laboratory, programming and applied simulation courses are integrated into the curriculum providing practical, job-qualifying skills in applied engineering complementary to the theoretical studies.

Overall, the programme provides graduates with excellent qualifications for postgraduate academic education as well as for direct career entry as a process engineer in industry and in administrative and governmental areas with very good career prospects. Fields of activity are e. g. in research, management, engineering, and operation of plants in the chemical and petrochemical industry and comparable. Typical entry levels with a bachelor’s degree are positions as process engineer, operations assistant, or deputy positions in plant and lab management.

## **Conclusion**

The criterion is fulfilled.

### **2.3.2 Concept of the study programme and its implementation/Curriculum (§ 12 (1) sentences 1 to 3 and 5 specimen decree)**

#### **Documentation**

Students in the Bachelor programme “Process Engineering” (B.Eng.) must take the following 14 programme specific modules in addition to the common used modules: “Introduction to CAD”, “Mechanics III”, “Introduction to Process Engineering”, “Heat and Mass Transfer”, “Multi-Phase Flow”, “Chemical Process Engineering”, “Mechanical Process Engineering”, “Thermal Separation Process”, “Control and Automation”, “Simulation Techniques”, “Petroleum and Petrochemical Processing” “Process laboratory” and “Plant design I and II”.

#### **Assessment**

The curriculum of the study programme “Process Engineering” reflects the qualification objectives in an exceptional way and is structured in the typical pattern for study programmes in the field of process and chemical engineering. In the first semesters, a sound knowledge of mathematical, scientific, and engineering fundamentals is provided. In the further course, the specialization in process engineering follows through relevant modules. Emphasis is placed on mathematical knowledge and expertise in the field of numerical and simulation methods as well as practical orientated lab courses. Four obligatory projects (in future three), an internship and the bachelor’s thesis allow students to individualize their studies and set their own priorities. Currently, there are no electives in the curriculum, but it is planned to incorporate five electives in the programme. The expert group welcomes the integration of further elective courses for students, as this allows them to further sharpen their profile. This also creates more opportunities for the flexible integration of study contents on new developments in process engineering and future technologies, for example related to the transformation of the chemical industry, climate-neutral and resource-saving production or circular economy. Therefore, further electives should be considered.

The programme is sensibly structured, with most courses having between 4 and 6 ECTS credits, which is appropriate. Smaller courses are labs and programming courses or minor subjects such as “Engineering Economics”.

The teaching methods are well adapted to the content of the programme. Theoretical knowledge is taught in a competence-oriented manner in form of lectures with tutorial-guided exercises. In addition, eLearning formats have also been developed and will be expanded more in the future. Laboratory, programming, and simulation courses focus on the application and engineering practice, development of experimental and IT-skills as well as groupwork, oral communication and written documentation. The project work courses aim to project management skills, strengthen the connection

between theoretical knowledge and practical application, and give the students the opportunity to gain hands-on experience in a workshop.

## **Conclusion**

The criterion is fulfilled.

## **2.4 Environmental Engineering**

### **2.4.1 Objectives of the study programme (§ 11 specimen decree)**

#### **Documentation**

GUtech has defined the following objectives for its study programme “Environmental Engineering” (B.Eng.):

“Graduates from the Bachelor of Engineering in Environmental Engineering will also have developed the following attributes and skills that will allow them to carry out successfully the duties of an Environmental Engineer:

- Knowledge and Understanding of Engineering – Graduates will have gained a broad and sound knowledge in mathematics, science, and engineering, enabling them to understand the phenomena characteristic of Environmental Engineering. The graduates will also have gained an understanding of the broader multi-disciplinary context of engineering sciences.
- Environmental Impacts and Mitigation – Graduates will be able to identify, formulate and solve problems particular to the surrounding environment based on the application of established scientific methods; graduates will also be able to analyse environmental impacts of products, processes, and methods based on scientific facts; they will know how to select suitable methods of analysing, modelling, simulating and optimizing and apply them with a high degree of competence to mitigate negative impacts.
- Green Innovation and Entrepreneurship – Graduates will have acquired the ability to develop innovative ideas and transfer them to green businesses based on scientific facts; they will have developed a practically-oriented understanding of green businesses and the ability to apply it in a competent manner.
- Investigations and Assessment – Graduates will be able to carry out literature research and know how to use Geographic Information System (GIS) and other sources of information for their work; they will have developed the skills to plan and carry out suitable experiments, interpret the data and draw suitable conclusions.

- Engineering practice – Graduates will have developed the competencies to transfer new findings in engineering and natural sciences to sustainable development actions for Oman and the whole region, including sustainable water management, green buildings, renewable energy waste management, and controlling air pollution; they will also be able to independently consolidate the knowledge gained and will be aware of the related environmental impacts of engineering activities and mitigation measures.”

## Assessment

The university presents the objectives of the study programme in the self-report in a realistic and meaningful way. In addition to the general objectives of engineering sciences, the objectives include the necessary competences for tasks in environmental engineering. In addition to academic qualification and qualification for the labour market, personal development is also given due consideration.

The aim of the programme is to create a new generation of engineers who recognise the challenges of society in relation to the environment and natural resources, who are sensitive to environmental risks and who are able to develop and implement concepts for a sustainable solution.

One aim of the study programme is to provide students a solid theoretical knowledge of environmental issues. In addition to the fundamentals of natural sciences and engineering, this includes a sound theoretical and practical understanding of environmental issues as well as the ability to develop scientifically based approaches to solutions.

The following specific topics of environmental protection are part of the curriculum: an overview of the global and local challenges, renewable energy systems and energy efficiency, methods for controlling air pollution, types and rating systems of green buildings, procedures of environmental impact assessments, technologies of wastewater treatment and desalination, methods for solid waste management, and light and noise pollution control. The topics mentioned here include the most important current subjects in environmental technology.

The programme is oriented towards integrating application-oriented issues into the teaching in addition to the purely theoretical natural and engineering science topics. Conducting experiments, evaluating and interpreting the measurement results constitute an essential measure of the teaching of practical competences. They serve experience in the practical implementation of theoretical contexts and the processing of environmental technology issues.

The programme includes not only theoretical and practical technical-scientific knowledge, but also a focus on social and economic issues. The solution of numerous problems relevant to the environment and the creation of concepts for sustainable development requires dealing with social and economic issues.

The study programme aims to prepare students for a career as an environmental engineer. The potential fields of work for graduates are very diverse. Interesting and qualified jobs for environmental engineers are found in industry, in research institutions, in engineering offices, in public authorities and in environmental protection organisations. The tasks of the various professional fields concern planning, development and monitoring of technical processes with regard to environmental protection and resource consumption, measurements of pollutant emissions, evaluation of environmental effects as well as the development and implementation of economic and political measures to protect the environment. The concept of the study programme allows for a relatively broad education to prepare students for the different professional fields of environmental engineers.

According to the experts, the study programme defines suitable objectives for a qualified education in the field of environmental technology. In addition to imparting scientific knowledge, the concept serves to create practical experience and to acquire the necessary professional and personal skills.

## **Conclusion**

The criterion is fulfilled.

### **2.4.2 Concept of the study programme and its implementation/Curriculum (§ 12 (1) sentences 1 to 3 and 5 specimen decree)**

## **Documentation**

Beside the commonly used modules, students have to take the following programme specific courses “Environmental Law” in the 4<sup>th</sup> semester, which is followed by the courses “Global Change and Sustainable Development, “Renewable Energy and Energy Efficiency”, “Sea Water Desalination”, “Hydrology and Water Resources”, “Air Pollution Control” “Integrated Water Resources Management”, Solid Waste Management”, Introduction to GIS”, “Environmental Engineering Lab Methods” in semester 5 and 6 and finally the modules “Environmental Impact Assessment”, Light and Noise Pollution” and “Green Building” in semester 7. In the 8<sup>th</sup> semester students write the Bachelor thesis.

## **Assessment**

The four-year study programme “Environmental Engineering” (B.Eng.) overlaps in the first two years with the engineering programmes of “Mechanical Engineering” (B.Eng.) and “Process Engineering” (B.Eng.) regarding the joint courses. In the first four semesters, the curriculum covers the relevant basics of mathematics, physics, chemistry as well as engineering from the fields of mechanical, electrical, and material engineering, thermodynamics, and different practical methods as “Engineering Drawing”, “CAD”, “Programming”, “Engineering Calculation”.

The current curriculum provides for the “Environmental Engineering” course in the third semester as the first course on environmental engineering topics. It serves to convey basic concepts in the field of environmental engineering. In the fourth semester, the course “Environmental Law” is offered. From the 5th to the 8th semester, the curriculum includes special courses in environmental engineering. In these semesters students' knowledge and skills in environmental engineering are meaningfully deepened and broadened through the range of courses offered.

The “Project Work” modules aim to develop students' integrated approach to project work and gain experience in planning, project management and teamwork.

According to the expert group, the curriculum is well designed and essentially reflects the intended aims of the Bachelor programme “Environmental Engineering” (B.Eng.). The university provides future graduates of this degree programme with solid scientific and engineering competences and relevant practical professional skills.

A programme-specific change in the new curriculum proposed for 2021/2022 is the deletion of the course “Physics 2”, the integration of the new course “Wastewater Engineering” and adaption of course titles according to the content, so that the names reflect better the content.

The deletion of the Physics 2 module may be questionable. According to the faculty statement, the main contents of the previous course “Physics 2” will be taught in “Physics 1” and in other courses. A change of the topics in “Physics 1” is not indicated. The topics of electronics and magnetism may be covered in the “Electrical Engineering” course. However, since the “Physics 2” module will continue to be offered in the study programme “Mechanical Engineering” (B.Eng.), the prior knowledge of the students for the joint module “Electrical Engineering” will then probably be very different. Other topics such as waves, light and optics and modern physics cannot be covered in other modules. After the implementation of the changes, it should be evaluated, whether the students have sufficient knowledge in the field of physics to be able to successfully complete the other modules.

The reduction of the workload for some lectures allows for a higher number of electives. However, care should be taken here to ensure that when credits are reduced, the content and requirements for students are also reduced accordingly. ECTS credits must reflect the students' workload.

The range of compulsory elective modules allows students a certain amount of freedom in shaping their studies. But a much broader freedom of choice of courses does not seem to make sense, since many modules in the natural sciences and engineering are not dispensable for necessary competences. However, the high number of mathematics courses (Mathematics I, II and III as well as Numerical Methods) with a total of 24 ECTS is not essential for the objectives of this degree programme in the view of the expert group. A reduction in this proportion could be used to expand the range of elective subjects or other courses.



## **Conclusion**

The criterion is fulfilled.

The peer group gives the following recommendation:

- GUTech should evaluate whether the proportion of mathematics modules could be reduced in order to include more elective modules in the curriculum.

## **3 Overarching Aspects for all study programmes**

### **3.1 Mobility (§ 12 (1) sentence 4 specimen decree)**

#### **Documentation**

The modular structure of the study programmes enables mobility, as the modules are usually completed within one semester. Through the cooperative agreement with RWTH Aachen GUTech offers its students the possibility to visit lectures at RWTH Aachen. There is also the possibility to apply for a DAAD scholarship. In addition, GUTech has signed agreements of cooperation with other higher education institutions like University of Brescia or Cyprus International University. Students who plan to go abroad sign a learning agreement. Also, the internship offers possibilities to go abroad.

#### **Assessment**

Student mobility is supported by GUTech. Through cooperation with other universities, there are mobility offers for students. The International Office provides support in both financial and procedural matters. There are a few scholarships available for student mobility, so there is a lot of competition for a scholarship. The German courses within the LS courses, which are compulsory for all students, promote student exchange with German universities.

The number of outgoing students who spend a semester abroad is still low. Further agreements of cooperation could strengthen the mobility of students. Also, designating a mobility window could increase mobility of students. It would be beneficial to mention a certain time frame and not a specific semester, this would give some flexibility to the students.

Even though many students are interested in an exchange, they hesitate due to financial reasons or an insufficient offer of English courses. The expert group is positive about the fact that GUTech has expanded its international partnerships in order to offer its students a better range of options for a stay abroad. At RWTH Aachen University, only a few courses are offered in English at bachelor's level, so that the options for students are limited, as the German language skills acquired are not yet sufficient for attending courses in most cases.

A positive aspect is the virtual courses with international universities, where students are given the opportunity to discuss additional content.

The university also offers the possibility of accommodating foreign students for a semester, which promotes the exchange of students as well. Only few students are admitted per semester.

Also, additional cooperation with foreign partner universities would also promote mobility of students.

## **Conclusion**

The criterion is fulfilled.

The peer group gives the following recommendation:

- Student mobility should be further promoted. For example, through further cooperation with foreign partner universities and the designation of a mobility window.

### **3.2 Staff and Resources (§ 12 (2) and (3) specimen decree)**

#### **Documentation**

The three Bachelor programmes are offered by the Department of Engineering. The modules are taught by six permanent staff members (assistant professors, associate professors senior lectures, lectures), who are supported by a research and teaching assistant as well as drive-in and fly-in professors and lecturers (12 in total in 2020). The total teaching load in the study programmes ranges between 166 - 174 contact hours, of which 127 SWS are accounted for by the commonly used modules.

About 74 % of the teaching staff in the undergraduate programmes holds a PhD degree. Academic and administrative staff are recruited based on GUTech's recruitment policy. RWTH Aachen is involved in the recruitment of associate and full professors in the Bachelor and graduate programmes.

On the Halban campus there are lecture halls of varying size as well as different laboratories. So far there are 15 lecture halls and 43 classrooms, in addition there are five laboratories for the practical training of students, nine computer labs and a library on the campus, the students can also make use of the RWTH Aachen's electronic library. The library provides also learning areas, working desks as well as PC workstations.

GUTech has with myGUTech portal a unified portal for students and staff, which has links to different e-platforms within the university. It includes EduWave, as the university's student information system where students can register on courses, check timetables and grades. Also, EduWave is linked to Moodle in which study materials are provided.

## Assessment

Academic staff recruitment at GUTech follows the “Academic Recruiting Policy”, in which the standards for the designation to a position are clearly formulated. The regulation ensures that the selection, appointment, and promotion of academic staff is made according to the relevant qualifications and relevant workplace experience, thus effectively ensuring that all candidates are treated equally. The expert group assesses the recruiting procedures of the GUTech as appropriate and in line with international academic standards.

Courses will be taught mainly by permanent academic staff, visiting professors will be invited to teach specialised courses that cannot be covered by GUTech staff. Fly-ins usually teach block courses. Both, local and fly-in teachers have a broad network to the corresponding industry. This provides the students with good opportunities to establish contacts for the internship.

The expert group assesses the existing staff resources as sufficient for the reviewed study programmes. All lecturers are very well qualified and highly dedicated to teaching and student support. There is a close contact between teaching staff and students. The teaching load seems to be reasonable, however, GUTech should consider ways of allowing more time for research. So far, the teaching load for a professor is ten contact hours per week, for assistant professors it is 12-16 hours/week, lecturers and senior lecturers teach 20 hours/week and assistant lecturers 22 hours/week.

There are various possibilities for the lecturers to continuously improve their academic qualification. In many cases they can spend an appropriate time at partner universities, but they can also attend international congresses. This is fully supported by the management of the university. In addition, GUTech offers staff development workshops.

GUTech has a modern well-equipped campus with laboratories, teaching rooms, a well-equipped library, and IT equipment. Since the last accreditation, the number of laboratories has been further increased. The university presented the existing laboratories and their equipment in an instructive video to the expert group. The lecturers are supported in the laboratory courses by Laboratory engineers and other technical staff, whose numbers are adapted to the respective needs. The equipment of the laboratories is adequate for the three Bachelor programmes and meets all relevant requirements for the intended practical academic training. The equipment is continuously expanded in a future-oriented manner.

The myGUTech portal offers students and staff a good range of electronic services for communication and efficient management of teaching and learning processes.

## Conclusion

The criterion is fulfilled.

### 3.3 Examination System (§ 12 (4) specimen decree)

#### Documentation

GUtech has an “Assessment and Examination Policy” which clearly describes the examination system in general, the tasks of the examiners and the principles of assessment as well as possible forms of assessment and examination procedures.

In particular, the “Assessment and Examination Policy” regulates that

- assessment tasks must be adjusted to learning outcomes and be described clearly,
- assessments are valid and reliable,
- assessments are fair and transparent, and
- students receive timely and constructive feedback.

The Board of Examiners evaluates whether the planning and execution of examinations is in accordance with the “Academic Regulations” and the “Assessment and Examination Policy” and provides corresponding feedback to the dean of the faculty.

Various types of examination are used in the Bachelor programmes to evaluate the students' competences. In addition to oral and written examinations also project work, homework, presentations, assignments (including labs), excursion and seminar reports are implemented. Modules finish in general with a final exam, which must be conducted in the two-week examination period after the end of the lectures. Beside this, there is also a continuous assessment through assignments and quizzes throughout the semester to ensure that students develop and enhance relevant skills but also obtain permanent feedback on their performance.

The final grade is computed as the weighted average of all assessments and the requirements to pass a module are specified in the module description. Students who failed a course have the right to repeat the exam.

Exams are centrally scheduled by the Registry and Students Admissions department, usually there is at least one free day between two exams. Since block courses are completed earlier in the semester, the final examination may be scheduled in the weeks following the block courses.

#### Assessment

The examination system at GUtech is well organised. It follows common university standards. All assessment regulations are clearly described in the “Academic Regulations” which have been approved by the Board of Governors. Here students can inform themselves about the assessment and examination policy, the duties of the Board of Examiners, the different forms of assessments and

examinations and the GUTech grading system. The framework of GUTech's examination procedures is also regulated within the "Assessment and Regulation Policy".

In general, all courses within the programs PE, ME and EE finish with a final assessment. Around 70% of the assessments in the Bachelor programs are final exams which take place in a dedicated examination period at the end of each semester. Students' performance is also monitored throughout the semester, e.g., in terms of participation, quizzes and assignments so that students obtain continuous feedback. The students' progression is continuously assessed in order to ensure that the students develop and enhance relevant skills and that they obtain permanent feedback regarding their performance. This helps them also to prepare for the final exam which evaluates whether the defined learning outcomes are achieved.

Examination conditions are transparently communicated to students at the beginning of each semester. Assignments and quizzes combined with the final examination assure a competence-oriented examination system with a broad variation of examination types. The examinations are course-related as well as knowledge and competence oriented.

For handicapped students individual solutions are found for the examination procedures. Special examination arrangements are made in individual cases.

The various examination formats are useful and adequate to measure the performance (outcome orientation) of students and reflect the competency-orientated approach. Assessments are very carefully developed, including a multi-eye principle, to ensure that they are aligned to the learning outcomes of the corresponding courses. Overall, students are satisfied with the examination practice.

Transparency, quality assurance and equality aspects are very well ensured, e.g. by the Board of Examiners, uniform rules and clear processes. A well-organized system is established for grade changes upon informal and formal appeals, and repeating exams.

## **Conclusion**

The criterion is fulfilled.

### **3.4 Student-centered learning and studyability/ (§ 12 (5) specimen decree) and public information (ESG 1.8)**

#### **Documentation**

General information on the programmes, requirements for the admission and admission procedure, skills and contact persons is accessible to students and the public on the website. Students receive a handbook upon enrolment which provides all necessary information, e.g., about the academic

calendar, academic counselling, study programmes, contact details of staff, learning support, facilities and resources, student code of conduct. Detailed course catalogues provide valuable information for students.

All three study programmes are structured in courses that are completed within one semester. Different teaching forms are used in the courses, which should promote active participation and learning of students like e. g. lab work, tutorials, or discussions within the lectures.

In addition to the final module exam at the end of the module, the students have to complete smaller assignments or quizzes during the semester in order to deepen their knowledge and at the same time to prepare for the next lecture.

### **Assessment**

All necessary information on the study programmes is well documented. All three Bachelor programmes are well structured and planned. There is no overlapping of courses or exams. The allocation of credits at GUTech for the study programmes is carried out according to the estimated student workload needed to achieve the defined learning outcomes. The overall student workload consists of attending and preparing lectures as well as preparing and taking exams, thesis writing, seminars and semester assignments. The workload is calculated in ECTS credits resp. working hours.

Individual learning areas enable students to study on their own terms. In order to provide people with physical disabilities access to the study programmes, the building is completely barrier-free. Students are quite satisfied with their study programmes and feel that their needs are taken into consideration.

The weekly workload at GUTech is set at around 47 h per week. This results from the 30 credit points per semester with 25 hours of work each, distributed over 14 weeks plus two weeks exam period. After discussion with the students, the expert group assesses the workload as demanding but appropriate. GUTech regularly monitors the workload of students via course evaluations. It should be noted, however, that the workload and also the ECTS credits vary slightly in the respective semesters. Especially semesters with seven modules represent a significantly higher workload. However, through the continuous learning process the students are able to keep up with their workload. Overall, students showed a high satisfaction with their study programmes and graduates reported that the programmes have been adjusted in terms of content and workload in the last years, also based on students' feedback.

Block seminars by the fly-in professors were emphasized by the students as being particularly labour-intensive, the workload of the block courses therefore should be kept in mind. Maybe online-courses arranged in the weekly class schedules could be a suitable compromise. The expert group notes that GUTech has already reduced the amount of block courses since the previous accreditation in response to one of the recommendations.

The study programmes, the examination requirements and the admission requirements are well documented and accessible to students. Students are regularly invited to attend information events and workshops on a variety of themes such as coping with stress, long-term studies, etc. The “Orientation Day” at the beginning of the first semester informs students about important policies and rules as well as library regulations etc.

The documentation of all information necessary for the students is well structured. For students a well-elaborated course handbook is available which provides information on learning outcomes, workload, syllabus, recommended literature, among others. The website provides valuable information about GUTech and its activities. Beside information about the study programmes, information about e.g. ongoing research projects, admission requirements, and student life is provided.

In summary, the expert group assesses the study programmes as studyable and student-centered. The workload is overall manageable.

## **Conclusion**

The criterion is fulfilled.

### **3.5 Up-to-dateness of the subject-specific and academic requirements (§ 13 specimen decree)**

#### **Documentation**

The aim of GUTech is to offer degree programmes that meet international standards, the university wants to become one of the leading universities in the region. According to the university, the state of the art of the curricula is guaranteed on the one hand by the connection to RWTH Aachen University, but also by the lecturers' own research projects and attendance at conferences and congresses. The German point of view is integrated into the curricula by the fly-in professors. Departmental Curriculum Committees regularly monitor and review the study programmes and discuss about the content of the courses, this is often done in cooperation with RWTH Aachen and the External Advisory Board. Curricula changes are then suggested to the Department Board. To ensure the quality of its study programmes, GUTech involves RWTH Aachen or other partner institutions in the development of its programmes.

#### **Assessment**

The documentation and the discussions illustrated that the degree programmes are updated frequently. Since the last accreditation, various changes have been made, and proposals for further updating of the study programmes have already been elaborated. The programmes are adjusted to the requirements of the government as well as the changing industrial and environmental demands

not only in the Sultanate of Oman. Especially the changing emphasis on environmental aspects, computational engineering and alternative energies in all programmes shows the awareness of the lecturers according to up-to-date demands in the society.

A broad variety of didactic concepts are used, and blended learning concepts were added due to the pandemic situation. In particular online learning concepts should be continued where applicable, for example for courses of fly-in lecturers.

Students could participate in several third-party research funding projects (for example the Shell Eco Marathon races) to train their practical engineering skills in project works or bachelor theses. Being part of research activities is motivating, educating and hence an important part in the qualification process of the students.

The measures taken to ensure the actuality of the programmes are well chosen, appropriate and ensure an appropriate and up-to-date design of the three Bachelor programmes.

## **Conclusion**

The criterion is fulfilled.

### **3.6 Quality Assurance/Academic Success (§ 14 specimen decree)**

#### **Documentation**

Quality management at the GUTech is largely determined by its quality assurance policy, GUTech also cooperates in quality management with RWTH Aachen. The Chair for Quality Management and Metrology at RWTH Aachen University also supports the continuous improvement of GUTech's quality management system. The Quality Assurance and Planning Department (QAP) is the focal point for accreditation and other quality assurance related matters. It reports directly to the Rector and interacts routinely with the Rectorate. The department also manages the relevant surveys. So far, the following surveys are carried out on a regular basis at GUTech:

- Course evaluations once a semester (theses are conducted before the major final exams)
- Evaluation of student satisfaction on non-academic matters once a year
- Graduating exit once a year
- Graduate first destination one year after graduation
- Alumni surveys after 3 years per cohort (alumni surveys are conducted by the Student Affairs Department)



According to a decision by the rectorate the results of the course evaluation are not released until the Board of Examiners has confirmed the course grades. The GUtech is also continuously monitoring its students' progress throughout their studies, it monitors passing rates as well as graduation rates. Staff members are informed about the survey results and should discuss them with the students.

In addition, the department maintains direct contact with the students so that students can give feedback directly and problems can be solved promptly.

### **Assessment**

The processes of continuous monitoring of the study programmes are subject to the central quality management cycle. The Bachelor programmes are adjusted based on the results of frequent and regular evaluation as well as measures of external review as for instance accreditation procedures. The process of internal quality assurance implemented at the GUtech represents a closed quality cycle loop. The expert group regards this process as suitable for further development of programmes. The objectives and the content of the three degree programmes are regularly reviewed and updated to ensure a continuous improvement of the programmes according to international standards. A sufficiently wide range of suitable quality measures is used. The evaluation of the student workload is part of the course evaluation. GUtech has implemented several procedures for receiving feedback from the students.

Course participants are asked to complete an anonymous evaluation survey towards the end of each course. Teachers are encouraged to discuss the results of the survey with students after the final exams. However, the course evaluations are conducted only at the end of the semester, so feedback is hardly possible after the examination. By this time, the courses and examinations have already been completed and the students are already in the lecture-free period. Therefore, it is difficult for staff members to provide feedback to students about the evaluation results and planned improvements. The expert group recommends to GUtech to find suitable ways to release the results of the surveys earlier so that they can still be discussed with the students.

In the discussion with the experts, students said that their remarks do not always have an effect. They would also like to see a broader space for comments in the evaluation sheet.

Survey results are discussed within the Curriculum Committee; according to the results the committee proposes changes in the curriculum which are presented afterwards to the Departmental Board for approval.

There are also formalized procedures for complaints and grievance.

## Conclusion

The criterion is fulfilled.

- As part of the evaluation process, GUtech should provide students with feedback on the survey results and on planned actions/measures.

### 3.7 Gender Equality and Diversity (§ 15 specimen decree)

#### Documentation

GUtech has a non-discrimination policy, which is stated in its values: *“GUtech is committed to ethical principles in all of its undertakings. In particular, the University welcomes students and employees from both genders, all ethnic, geographical, cultural, and religious backgrounds. The University encourages association in peace and with tolerance and welcomes further intercultural exchange between Oman and Germany”*. The campus of GUtech campus is barrier-free, when necessary, special individual examination arrangements are made. The facilities at GUtech are accessible by wheelchair. Regulations for students with special needs are defined in the “Academic Regulations”.

#### Assessment

According to the expert group GUtech’s concepts of gender justice and equal opportunities are fully implemented in its study programmes. Gender aspects are fully considered at GUtech within the student, staff and faculty bodies. It is evident, that GUtech attracts quite a lot of female students, so far the gender ratio is 80 % women: 20 % men. The university is open to all interested students without regard to race, ethnicity, geographical, cultural and religious background or disability. Students with special needs are provided with additional services and facilities. For students with disabilities and students with disadvantages GUtech negotiates individual solutions (like special examinations, special mentoring). The whole teaching facility infrastructure is suitable for students with special needs, including elevators. Regulations for students with special needs are implemented in the “Assessment and Examination Policy”. All in all, the GUtech campus is barrier-free.

## Conclusion

The criterion is fulfilled.

### **3.8 Cooperation with Higher Education Institutions (§ 20 specimen decree)**

#### **Documentation**

GUtech is designed to be an independently operating university, affiliated to RWTH Aachen University and controlled by the Board of Governors which is chaired by the Rector of RWTH Aachen University, hosting Aachen professors and representatives of public bodies of both countries. There is an Academic Affiliation Agreement between Oman Educational Services LLC (OES) and RWTH Aachen University in Germany which was updated in 2021. With the agreement, Oman Education Services LLC appointed RWTH Aachen University to provide support, if required, for the development of curricula for study programmes, quality assurance and expertise in setting up the operations of GUtech.

#### **Assessment**

The framework for the cooperation between GUtech and RWTH Aachen University is established through an affiliation agreement. RWTH Aachen supports GUtech in the design and implementation of new study programmes and supports GUtech also in the implementation of its quality management system. In addition, RWTH Aachen provides laboratory places and study places for visiting students, and academic staff of RWTH Aachen teaches as fly-ins in the programmes. The Department of Engineering also maintains relationships with other international higher education institutions, mainly for promoting student mobility and exchange of staff.

#### **Conclusion**

The criterion is fulfilled.

## **4 Summary**

The expert group considers the three Bachelor programmes “Mechanical Engineering” (B.Eng.), “Process Engineering” (B.Eng.) and “Environmental Engineering” (B.Eng.) at GUtech to be attractive degree programmes for students aiming at a career in the engineering industry of Oman and the (surrounding) region. All three Bachelor programmes are meaningful designed. The curricula are well structured and logical. The workload of the programmes is overall reasonable, but this should be continuously and carefully observed. Upon completion of the programme, students are well qualified for the labour market as well as for taking up a master’s programme.

The first four semesters are characterised by commonly used modules. Here, a solid basis is laid for the programme-specific modules in the higher semester. This concept also enables students to

change their degree programme in the first semesters without delay. The expert group supports the studies concept of common core and further programme-specific courses.

Practical elements are sufficiently integrated into the three programmes, both through the laboratory courses and the internship. After the second year of study, students acquire specialised knowledge and competencies together with the relevant social and soft skills as well as corresponding methodological skills. The requirements for a good engineering education are fulfilled in all three programmes through the practice-oriented teaching of the relevant technical and scientific knowledge as well as basic methodological knowledge. Active learning approaches, learning in small groups, and project work enhance the learning experience of the students. The amount and organisation of the assessments are appropriate, assessment regulations exist and are transparent.

Since the last accreditation, all three Bachelor programme have been well developed, relevant content has been added, which strengthens the employability of graduates. Some courses have been shifted to other semesters, which further strengthens the study structure, also ECTS credits have been adjusted. Further changes are planned in the near future, based on feedback from students, graduates, and the labour market. The expert group welcomes these changes, which give students the opportunity to take elective modules. However, the workload of the students must be kept in mind. As credits have been reduced in some cases, the content of the courses must also be adjusted accordingly to prevent students from being overloaded. GÜtech should undertake a close evaluation of the workload upon implementation of the changes. It should also evaluate to what extent the reduction of the ECTS credits for the internship and the remove of the module “Project Work III” affects the practical and professional competencies of the students.

#### **4.1 Mechanical Engineering (B.Eng.)**

The Bachelor's programme “Mechanical Engineering” (B.Eng.) is assessed positively by the expert group. The programme has meaningful qualification objectives with a solid curriculum that is well aligned with the defined qualification goals and the requirements of the labour market. Students receive a professional qualification that enables them to work independently as engineers, they are trained to become an engineering personality. In addition to the necessary methodological and technical knowledge, they also acquire relevant social and soft skills for their professional life. The curriculum is well designed, current developments in the field are reflected.

#### **4.2 Process Engineering (B.Eng.)**

The expert group got an overall positive impression about the Bachelor programme "Process Engineering" (B.Eng.). The programme is structured in a meaningful way. The qualification objectives

are meaningful designed. The programme offers students an in-depth insight into the relevant subjects on process engineering. From the fifth semester onwards, students deepen their knowledge in chemical and mechanical processes as well as thermal separation processes and plant design and apply their skills during the internship. In the new curriculum the module “Bioprocess and Bioreaction Engineering” will further strengthen the employability of the graduates. According to the impression of the expert group, there is a good demand on the labour market in the region for the graduates, and the career prospects are considered as good.

### **4.3 Environmental Engineering (B.Eng.)**

Overall, the Bachelor programme “Environmental Engineering” (B.Eng.) left a positive impression on the expert group. The subject-specific, methodological, and interdisciplinary qualification objectives are clearly formulated and aim at the acquisition of basic knowledge in natural sciences and engineering, methodological competence as well as also practical professional experience. The structure of the programme enables students to systematically build up subject and methodological knowledge and competences. According to the recommendation of the expert group) in the previous accreditation, the module “Environmental Law” was shifted to an earlier semester. As a new course “Fluid Dynamcis” was added to the study plan.

## **5 Accreditation recommendation of the expert group**

The expert group recommends the accreditation of the Bachelor programmes “Environmental Engineering” (B.Eng.), “Process Engineering” (B.Eng.) and “Mechanical Engineering” (B.Eng.) **without conditions.**

#### **IV Accreditation Decision**

On the basis of the expert report the accreditation commission took on its meeting on 20 September 2021 the following decisions:

##### **Environmental Engineering (B.Eng.)**

**The Bachelor programme “Environmental Engineering” (B.Eng.) is accredited without conditions.**

**The accreditation is valid until September 30<sup>th</sup>, 2027.**

The following recommendation is given for the study programme “Environmental Engineering” (B.Eng.)

- GUTech should evaluate whether the proportion of mathematics modules could be reduced in order to include more elective modules in the curriculum.

##### **Mechanical Engineering (B.Eng.)**

**The Bachelor programme “Mechanical Engineering” (B.Eng.) is accredited without conditions.**

**The accreditation is valid until September 30<sup>th</sup>, 2027.**

##### **Process Engineering (B.Eng.)**

**The Bachelor programme “Process Engineering” (B.Eng.) is accredited without conditions for the first time.**

**The accreditation is valid until September 30<sup>th</sup>, 2027.**

**The following overall recommendations are given for all study programmes:**

- The workload of students should be distributed more evenly over the semesters. A workload of 30 ECTS per semester would be desirable.
- Module descriptions should specify the proportion of hours spent in laboratory practicals.
- When reducing the ECTS points in modules in the new curricula, GUTech should ensure that the contents and requirements in the modules are changed accordingly.
- As part of the evaluation process, GUTech should provide students with feedback on the survey results and on planned actions/measures.
- Student mobility should be further promoted. For example, through further cooperation with foreign partner universities and the designation of a mobility window.

## **V Decision of the Accreditation Commission of ACQUIN**

Based on the evaluation report of the expert group and the statement of the Higher Education Institution, the Accreditation Commission of ACQUIN decided unanimously on its meeting on 27 September 2021:

### **Environmental Engineering (B.Eng.)**

**The Bachelor programme “Environmental Engineering” (B.Eng.) is accredited without conditions.**

**The accreditation is valid until September 30<sup>th</sup>, 2027.**

The following recommendation is given for the study programme “Environmental Engineering” (B.Eng.)

- GUTech should evaluate whether the proportion of mathematics modules could be reduced in order to include more elective modules in the curriculum.

### **Mechanical Engineering (B.Eng.)**

**The Bachelor programme “Mechanical Engineering” (B.Eng.) is accredited without conditions.**

**The accreditation is valid until September 30<sup>th</sup>, 2027.**

### **Process Engineering (B.Eng.)**

**The Bachelor programme “Process Engineering” (B.Eng.) is accredited without conditions.**

**The accreditation is valid until September 30<sup>th</sup>, 2027.**

**The following overall recommendations are given for the study programmes:**

- The workload of students should be distributed more evenly over the semesters. A workload of 30 ECTS per semester would be desirable.
- Module descriptions should specify the proportion of hours spent in laboratory practicals.
- When reducing the ECTS points in modules in the new curricula, GUTech should ensure that the contents and requirements in the modules are changed accordingly.
- As part of the evaluation process, GUTech should provide students with feedback on the survey results and on planned actions/measures.
- Student mobility should be further promoted. For example, through further cooperation with foreign partner universities and the designation of a mobility window.

## VI Annex

### 1 Not relevant criteria of the specimen decree

The following criteria of the specimen decree are not relevant for the study programmes

- § 9 Special criteria for cooperations with non-university institutions
- § 10 and § 16 Special regulations for joint degree programmes
- § 19 cooperations with non-university institutions
- § 21 Special criteria for Bachelor training course at colleges of cooperative education

### 2 Mapping Grid Specimen Decree and ESG

ESG	Specimen decree
ESG 1.1	§ 14
ESG 1.2	§ 6(4) § 8 § 11 § 12 (1), (4), (5) § 13
ESG 1.3	§ 12 (1), (4), (5), (6) § 15
ESG 1.4	§ 5 § 6 (1) – (4) § 12 (1) § 14
ESG 1.5	§ 12 (2)
ESG 1.6	§ 12 (3) § 15
ESG 1.7	§ 14
ESG 1.8	-
ESG 1.9	§ 14