

Accreditation Report

Programme Accreditation

University	German University in Cairo
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Study Programme 01	Mechatronics Engineering			
Degree	Bachelor of Science (B.Sc.)			
Form of Study	Full time mode	<input checked="" type="checkbox"/>		
Duration (Semesters)	8			
ECTS-Points	240			
Master only:	consecutive	<input type="checkbox"/>	continuing	<input type="checkbox"/>
Study Programme exits since (Date)	2007			
Capacity (Maximum Number of Students)	Per Semester	<input type="checkbox"/>	Per Year	275 <input checked="" type="checkbox"/>
Average Number* of new Students	Per Semester	<input type="checkbox"/>	Per Year	230 <input checked="" type="checkbox"/>
Average Number* of Graduates	Per Semester	<input type="checkbox"/>	Per Year	214 <input checked="" type="checkbox"/>
* reference periode	2015-2020			

Concept Accreditation	<input type="checkbox"/>
Initial Accreditation	<input type="checkbox"/>
Re-Accreditation No.	1

Study Programme 02	Mechatronics Engineering			
Degree	Master of Science (M.Sc.)			
Form of Study	Full time mode	<input checked="" type="checkbox"/>		
Duration (Semesters)	3			
ECTS-Points	90			
Master only:	consecutive	<input checked="" type="checkbox"/>	continuing	<input type="checkbox"/>
Study Programme exits since (Date)	2007			
Capacity (Maximum Number of Students)	Per Semester	<input type="checkbox"/>	Per Year	30 <input checked="" type="checkbox"/>
Average Number* of new Students	Per Semester	<input type="checkbox"/>	Per Year	12 <input checked="" type="checkbox"/>
Average Number* of Graduates	Per Semester	<input type="checkbox"/>	Per Year	8 <input checked="" type="checkbox"/>
* reference periode	2016-2020			

Concept Accreditation	<input type="checkbox"/>
Initial Accreditation	<input type="checkbox"/>
Re-Accreditation No.	1

Responsible Agency	ACQUIN
Responsible Consultant	Lisa Stemmler
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Short profile of the HEI and the study programmes

The German University in Cairo (GUC) was inaugurated in October 2003 with a first admission intake of 956 students. In comparison, the total of currently enrolled students in the undergraduate programmes is 11,010. The increase in total enrolment reflects the well-established reputation of GUC as well as the high demand for its study programmes. In addition, the overall average score of the newly admitted students is 95.27% over the last 10 years. Furthermore, the GUC offers scholarships to newly admitted students with high schools scores to attract academically outstanding students. The increasing number of students offered scholarships (69 students in 2003/2004 to 727 in 2018/2019) reflects the high quality of the students joining GUC. Today, the GUC consists of eight faculties with two further faculties in the planning stage.

The teaching language is English, while German is taught to allow the exchange of GUC students with other German universities and to facilitate their training in German companies.

Bachelor

The study programme “Mechatronics” (B.Sc.) at the GUC is designed to bridge the gap between the various related disciplines in a balanced way. This programme provides the students with a clear and comprehensive treatment of the various components of mechatronics systems following a multidisciplinary approach.

The term mechatronics derives from the two words 'mecha' for mechanics and 'tronics' for electronics. This term adopts an interdisciplinary and integrated approach bridging the gap between classical engineering fields of mechanical engineering, electrical engineering, computer engineering and information technology. The combination of these engineering principles helps generate innovative, more economical, reliable and versatile systems.

Due to the multidisciplinary nature of Mechatronics Engineering, the Mechatronics Study Programme at the GUC pays a great emphasis on the ability of the graduates to work across and between individual areas of technology with a balanced depth that comes from the understanding and appreciation of the contributions of other related areas of technology.

The courses within the Mechatronics Study Programme at the GUC are designed to ensure that there is an appropriate balance between depth and breadth within any course, as well as to provide opportunities to enable students to practice new competences. Team-based projects are integrated as an essential part of many courses within the programme. These projects help students to use information resources, get hands-on experience in designing and implementing mechatronics systems, and improve their communication skills. Through this approach, the graduates will develop technical expertise in mechanical design, computer-aided design, industrial automation as well as manufacturing technology. In addition,

they will develop technical expertise in digital design, microcontroller operation, interfacing, and programming, sensors, actuators, drive systems, control theory and industrial communication schemes. They will have the knowledge, skills and tools to design and analyze the engineering systems and components in a creative and innovative way for better operation, performance and control through integrating theory and practice and integrating computers, sensors and actuators in a mechanical system and using a wide range of analytical tools and software.

The graduates will also be well prepared to pursue further studies and research nationally and internationally with more potential and opportunities of going to Germany giving them the chance to embrace the concept of lifelong learning.

Master

The study programme “Mechatronics Engineering” (M.Sc.) at the GUC is designed based on the state of the art international educational and industrial requirements as well as the interdisciplinary nature. The programme consists of three semesters. Semester one and two include twelve courses (six core courses and six elective courses) and the thesis is done in the third semester.

Due to the interdisciplinary nature of Mechatronics Engineering, the programme places a great emphasis on the ability of the graduates to work across and between individual areas of technology and across the educational & industrial borders between the different disciplines. Having six elective courses offered after having a strong background in the different disciplines, enables the students to focus on one area that will serve their thesis or future careers or to focus on different areas that will serve their future plans. Study areas for specialization include robotics, autonomous systems, electro-hydraulics, renewable energy, flexible manufacturing systems and automotive.

Team-based projects are integrated as an essential part of many courses within the programme. These projects help students to use information resources, get hands-on experience in designing and implementing mechatronics systems, improve their competencies in communication skills, teamwork, and project management, but they enable them communicate with professionals and the public.

Graduates of the programme will have the knowledge, skills and tools to design and analyze the engineering systems and components in a creative and innovative way for better operation, performance and control. Graduates will also be well prepared to pursue further studies and research at the GUC and internationally as they will be oriented to the concept of lifelong learning.

Summary of the review

Bachelor

For the study programme “Mechatronics” (B. Sc.) a good quality in the teaching and learning forms has been shown. The students are able to achieve the expected competences and are supported in various aspects by the GUC.

For better transparency, the study regulations should contain a definition of all examination methods and also state the amount of hours per ECTS-point for the calculation of students`workload. A positive aspect at the GUC is the implementation of teaching assistants and the mentoring system. This supports efficient and effective learning within the GUC.

Considering the previous accreditation, the recommendations were taken into account and mostly implemented. Since this was not pointed out in the documentation, the GUC explained the implementation of the recommendations during the discussions. For instance, the workload of the first two semesters still seemed unbalanced despite the recommendation in the previous accreditation. Upon detailed explanation of the GUC, the expert group now regards the workload as balanced, but not displayed in an ideal manner.

The overall impression of this study programme is very positive. The review panel finds it particularly appreciable, that the responsible staff for the study programme and the students are making a good contribution to the further development of the mechatronics programme.

Master

The expert group comes to the conclusion that the study programme “Mechatronics Engineering” (M. Sc.) shows good quality in respect to learning and further education.

Due to national requirements for university study programmes, the share of Master's modules is a rather small part of the overall study programme Mechatronics Engineering and should rather be seen as a continuation of the Bachelor's programme. Therefore, the assessment is very closely linked to the assessment of the Bachelor's programme. There is just as much high-quality internal university supervision for the Master's thesis as for the other modules of the study programme.

I Formal criteria

1 Structure, duration, and profile of the study programmes

Both study programmes (bachelor and master) are offered in full time mode. The bachelor's programme consists of eight semesters and 240 ECTS-points while the consecutive master's programme consists of three semesters and 90 ECTS-points. Graduates accordingly reach 330 ECTS-points in eleven semesters, resulting from the legal requirements in Egypt: The legal framework for Egyptian bachelor's degree demands four years of full-time studying, plus one additional year for the master's degree. However, since the Egyptian master's degree does not contain a comprehensive graduation project by default, the GUC decided to follow international standards by concluding its programme with a Master Thesis.

2 Admission and enrolment

As an Egyptian private university, GUC complies with the admission regulations of the Supreme Council for Egyptian Universities and Private Universities Council of the Ministry of Higher Education. The Private Universities Council sets the general rules that regulate the admission to private universities including the minimum academic requirements for acceptance at private universities; the rules for admission to the bachelor programme include minimum High School Scores, qualifying subjects required by each secondary school certificate for each study group, complete documentation for registration, etc. During the GUC admission process, students complete the GUC Reasoning Test as well as the GUC Computerized English Language Test.

The rules for admission to the master programme are laid down in the document "Admission Requirements for M.Sc. programme engineering". According to this document, "the Master of Science (M.Sc.) can be earned only after the completion of the bachelor degree. At the present time, this programme is open only to graduates of the GUC as well as GUC Teaching Assistants.

Admission (for GUC continuing students)

Admission is only open to GUC Bachelor graduates who achieve a minimum of "C" overall grade and who are highly interested and strongly committed towards post-graduate studies and research. The final selection of the students is based on the GPA ranking and on availability of M.Sc. topics. Only students who completed successfully the Bachelor thesis and all courses of the 9th and 10th term courses are eligible to apply for a Master thesis.

Admission (for GUC Teaching Assistants)

Registration in the postgraduate studies is based on the postgraduate admission committee that evaluates the candidates individually according to their qualifications and credentials and decides on the extent to which the candidate requires pre-Masters courses in order to be eligible to enrol in the GUC

Masters Programmes. This is done for currently existing full-time assistants who are graduates from other universities. [...]”

In order to facilitate the exchange of students and recognition of learning results with partner universities, the GUC’s study programmes are aligned with the German Higher Education system and designed in cooperation with German partner Universities.

3 Degree

Upon successful completion of the study programmes the GUC awards the degrees Bachelor of Science and Master of Science respectively.

The GUC appoints 15 ECTS-points for the Bachelor Thesis which has to be completed within three months and 30 ECTS-points for the Master Thesis which has to be completed within six months.

4 Module structure and ECTS

The organization of GUC’s study programmes makes use of modular components and the European Credit Transfer & Accumulation System (ECTS) with generally 30 credits allocated to one semester. Minor deviations may occur.

In the bachelor programme each semester consists of six to eight modules on average, whereas the regular master’s semester consists of six modules. The last semester of the bachelor programme is occupied with the Bachelor Thesis and an internship, the last semester of the master programme is occupied with the Master Thesis.

Most modules show a workload of 4 to 8 ECTS-Points. Smaller workloads (1-4 ECTS-Points) result from module contents aiming at interdisciplinary competences / soft skills and thereby smaller workloads.

According to the Study Examination Regulations the average full-time students’ workload consists of 30 credit points per semester. Minor deviations may occur. According to the study plan, the first semester shows the highest number of ECTS-Points (33) and the second semester the lowest (26).

According to the information of the GUC within the discussions, one ECTS-Point equals the workload of 30 hours. This should be defined in the study regulations.

The Module Catalogue of both study programmes provide information on semester number, type of course, prerequisites, workload, ECTS-Points, aims and learning outcomes, content, learning and teaching methods, required facilities, assessment, references, and course coordinator.

Conclusion

The standards concerning structure, duration, profile, admission, enrolment, degree, module structure and ECTS are fulfilled for both study programmes.



II Review of the study programmes

1 Focus of the review

In the assessment procedure, the review panel first asked about the changes in the degree programme since the last accreditation, especially with regard to the recommendations given in the previous accreditation procedure. The implementation of the different laboratories, the workload distribution in the Bachelor's degree programme as well as the research activity of the lecturers also received special attention.

2 Content-specific criteria

2.1 Objectives and level of the programme

Bachelor

Documentation

In the future, there will be a high demand for mechatronics engineers as more industries seek to apply the technological advancements in computers, electronics, sensors, and actuators to improve their products, processes and services.

After the completion of the Bachelor of Science degree, a graduate will:

1. Demonstrate deep knowledge of the principles of mechanics, electronics, control theory, and computer programming.
2. Demonstrate the ability to think critically, solve problems and take decisions.
3. Be able to function effectively as members of multi-disciplinary teams and individually.
4. Be well prepared to pursue further studies and research nationally and internationally.
5. Demonstrate a deeper insight into current research.
6. Be prepared for a variety of professional engineering careers and interfacing with other functions.

The Mechatronics Engineering undergraduate will gain specific knowledge and skills in widely varied areas, and will be able to:

1. Apply knowledge of math, science, technical knowledge and mechatronics engineering to formulate and solve engineering problems in a creative and innovative way.
2. Conduct experiments and analyse and interpret the results.

3. Integrate theory and practice and solve problems across different subject areas.
4. Design components and systems in a creative and innovative way that integrate computers, sensors and actuators in mechanical systems to meet desired needs, and design experiments to evaluate system performance according to specifications and standards.
5. Use a wide range of analytical tools, techniques, and equipment and software packages pertaining to the discipline and develop required computer programmes.
6. Communicate technical matters effectively in oral, written and graphical forms.
7. Be capable of communicating with professionals and the public.
8. Function effectively as members of multi-disciplinary teams, plan and manage tasks, time and resources and demonstrate interpersonal skills.
9. Use information resources and recognize the importance of continued learning.
10. Demonstrate knowledge of contemporary engineering topics.
11. Demonstrate that she/he has acquired the ability to work under expert guidance.
12. Discuss a scientific problem in a written paper as well as in a presentation.
13. Gain knowledge in both English and German languages.
14. Develop their language skills and intercultural competence.

Graduates of the Mechatronics Study Programme can work in multidisciplinary design teams in industry, manufacturing, and research and development. Product developers and manufacturers are common employers for Mechatronics engineers. Graduates can also start their own companies and businesses.

Many existing jobs do currently or will soon require mechatronics skills among workers who currently design, implement, manufacture, and repair a wide range of equipment. Mechatronics engineers are involved in robotics, automated manufacturing, automobiles, airplanes, oil and gas industry, and renewable energy systems. Graduates are also sought after for management positions because of their broad skill base, knowledge of state-of-the-art technology and their ability to coordinate between different engineering specialties.

Another option for the graduates of the Mechatronics Study Programme is pursuing further studies and research nationally and internationally as they will be qualified for that.

There is a need for mechatronics engineers wherever there is potential for improvement and development through the integration of computer and electrical hardware with mechanical systems.

Assessment

The objectives outlined above are well defined. The Diploma Supplement contains detailed information on the qualification profile of the graduates. The objective and the qualification goals correspond to the usual standards for bachelor's degree programmes.

Due to state regulations, the Bachelor's degree programme must formally comprise 10 semesters = 300 ECTS. Therefore, it is customary to continue studying two semesters of Master's studies after the Bachelor's thesis in the eighth semester in order to obtain the Egyptian state Bachelor's degree. This also entails membership in the Egyptian Syndicate for Engineers.

Most graduates find a position within 3 months after graduation. The demand for mechatronics graduates in Egypt is very high. Industrial companies try to retain students in time, especially Egyptian subsidiaries of German companies. Graduates also find positions abroad, primarily in Germany. This confirms the university's correct definition of the study goals. The Bachelor's degree qualifies students for application to international Master programmes.

Personal development is promoted in the degree programme by different aspects, e.g. by teamwork in project work or by the participation in a student exchange, most particularly in Germany. In addition, there are very good opportunities for student leisure activities, e.g. sports. Also, the commitment of students outside the university is explicitly promoted and appreciated.

Conclusion

The standard is fulfilled.

Master

Documentation

After the completion of the Master of Science degree, a graduate will:

1. Demonstrate in-depth expertise in the fields of mechanics, electronics, control theory and computer programming in the light of the current research findings.
2. Design and conduct research.
3. Work efficiently independently and in teams.
4. Act ethically within a defined role.
5. Be prepared to join doctoral studies nationally and internationally (especially in Germany).

A Mechatronics Engineering graduate will gain specific knowledge and skills in widely varied areas, and will be able to:

1. Have a capacity for analysis and synthesis.

2. Develop critical and self-critical abilities.
3. Define a scientific question and be involved in research activities.
4. Evaluate proposed solutions and contribute to decision making.
5. Perform laboratory techniques related to his/her specialty component.
6. Demonstrate that she/he can perform a scientific task independently using scientific methods,
7. Communicate a specified research task and analyze achieved results, discuss and draw conclusions.
8. Communicate the research results both in an oral presentation and in writing.

Graduates of the study programme “Mechatronics Engineering” (M.Sc.) at the GUC have different options for their careers. Graduates can pursue further studies and research, join academia, join the industry, create their own business and companies or work across any of the aforementioned areas. They have high potential of continuing further studies and research. They will be well prepared and qualified to do so nationally and internationally.

Therefore, graduates of the Mechatronics Engineering programme at the GUC can work in multidisciplinary design teams in industry, manufacturing, research and development as they are specialized in problem solving skills required in innovation. Product developers and manufacturers are common employers for Mechatronics engineers. Even more, graduates are able to start their own companies and businesses. Mechatronics engineers are involved in robotics, automated manufacturing, automobiles, airplanes, oil and gas industry, and renewable energy systems. Graduates are also sought after for management positions because of their broad skill base, knowledge of state-of-the-art technology and for a very important strength of Mechatronics engineers which is their ability to manage and coordinate between different Engineering specialties which is a cost effective value in an interdisciplinary world.

There is a need for mechatronics engineers wherever there is potential for improvement and development through the integration of computer and electrical hardware with mechanical systems.

Assessment

The Diploma Supplement contains detailed information on the qualification profile of the graduates. The qualification objectives correspond to the usual standards for Master's degree programmes.

The Mechatronics Master's programme is consecutive. Most GUC bachelor's graduates continue studying the master's programme, as the completion of semesters 9 and 10 is a prerequisite for obtaining the Egyptian state bachelor's degree.

Most graduates take up employment within 3 months of graduation since the demand for graduates seems to be very high.

After completing the Master's programme, graduates are qualified for a PhD programme. Even if the GUC itself does not offer any postgraduate studies yet, the graduates can apply for postgraduate studies in national or international universities, primarily in Germany but also in English-speaking countries. The international contacts of the GUC as well as lecturers from abroad provide support.

Conclusion

The standard is fulfilled.

2.2 Concept of the programme and its implementation

2.2.1 Curriculum

Bachelor

Documentation

The study programme consists of eight semesters in which the students will complete 49 modules of different workload, complexity and aims.

Semester 1:

Chemistry (6 ECTS-Points), Introduction to Computer Science (6 ECTS-Points), Mathematics I (8 ECTS-Points), Physics I (5 ECTS-Points), German Language I (3 ECTS-Points), Academic Study Skills (2 ECTS-Points), and Production Technology (2 ECTS-Points).

Semester 2:

Introduction to Computer Programming (5 ECTS-Points), Engineering Drawing and Projection (3 ECTS-Points), Mathematics II (8 ECTS-Points), Physics II (5 ECTS-Points), German Language II (3 ECTS-Points), and Critical Thinking and Scientific Methodology (2 ECTS-Points).

Semester 3:

Data Structures and Algorithms (6 ECTS-Points), Digital Logic Design (4 ECTS-Points), Electrical Circuits I (5 ECTS-Points), Mechanics I (4 ECTS-Points), Mathematics III (8 ECTS-Points), German Language III (3 ECTS-Points), and Communication and Presentation Skills (2 ECTS-Points).

Semester 4:

Computer Programming Lab (4 ECTS-Points), Computer Organization and System Programming (4 ECTS-Points), Electrical Circuits II (5 ECTS-Points), Strength of Materials I (4 ECTS-Points), Mechanics II (4 ECTS-Points), Introduction to Materials Engineering (4 ECTS-Points), German Language IV (3 ECTS-Points), and Research Paper Writing (2 ECTS-Points).

Semester 5:

CAD Lab (4 ECTS-Points), Engineering Design I (6 ECTS-Points), Digital System Design (4 ECTS-Points), Control Engineering (5 ECTS-Points), Fluid Mechanics (5 ECTS-Points), and Engineering Thermodynamics (5 ECTS-Points).

Semester 6:

Materials Manufacturing Technology (4 ECTS-Points), Engineering Design II (6 ECTS-Points), Electronic Circuits (4 ECTS-Points), Numerical Analysis (4 ECTS-Points), Introduction to Management (2 ECTS-Points), and Mechatronics Engineering (9 ECTS-Points).

Semester 7:

Machine Design (4 ECTS-Points), Power Electronics (5 ECTS-Points), Electric Machines (4 ECTS-Points), Industrial Automation (4 ECTS-Points), Modern Control Engineering (4 ECTS-Points), Pneumatic and Hydraulic Control (4 ECTS-Points), and Mechatronics Lab (6 ECTS-Points).

Semester 8:

Internship/Training (15 ECTS-Points) and Bachelor Thesis (15 ECTS-Points).

Alongside these modules, the internship is an essential part of the GUC study programmes, the students of "Mechatronics" (B.Sc.) must complete a total of 12 weeks of internships before their graduation. The internship must be practical and related to the student's majors; the students have the option to apply for industrial, research or corporate internships, the aim of the internship is to link between the academic programmes studied and their actual implementation in the field. Additionally, it will help the students expand their areas of knowledge and have a clear vision about possible career options.

The Internship must fulfil the following criteria:

- Offer practical hands-on experience,
- Give the intern an insight about the latest technology/research updates,
- Offer a clear overview about the profession and different stakeholders involved in the operations,
- Develop the intern's interpersonal skills such as team work, time management, and project management,
- Must be related to the field of study,

- A total of 12 weeks of internships before their graduation; the internship could be consecutive or non-consecutive. If not consecutive, the duration of the internship should be at least 4 weeks consecutive,
- Must be conducted after the 4th semester,
- A detailed evaluation & report must be submitted to the Student Career & Alumni Development – SCAD – office after the completion of the internship.

The Bachelor Thesis shall showcase the students' ability to identify a worthwhile problem or question which has not been previously answered, as well as to solve the problem or answer the question.

Assessment

Overall, the bachelor curriculum is structured adequately and balanced containing engineering fundamentals (common to all engineering programs), language, research methodology and mechatronics fundamentals. Semesters 7 and 8 consist of advanced courses, internship and the bachelor thesis.

Unlike other comprehensive four-year study programmes, the eight-semester bachelor curriculum does not contain elective specialization. The GUC reported this to result from Egyptian regulations, which in general do not include elective courses. Students can, however, select their area of specialization via the internship and the subject of the bachelor thesis. As mechatronics is a wide field, some elective focus for the 4th year would nevertheless be useful and beneficial for students' profiling. The expert group would appreciate any development in this field.

The final semester of the programme consist of a three months' internship and the bachelor thesis, which is limited to three months as well. The internship provides an excellent opportunity for getting acquainted with practical problems and solutions in the industry. The GUC internship procedure has been updated; the internship is now a mandatory part of the curriculum. Students receive support during the internship and are required to write an internship report which will be evaluated. There is no formal presentation of the report, but the students give a face-to-face presentation to their academic supervisors.

According to the schedule of study, the ECTS are not balanced equally over the first three semesters (33-26-32 ECTS), which was already addressed in the last review. The GUC explained that for the first year all students of engineering take the same courses with the first semester including a preparatory course that brings students from different schools to the same level of knowledge. The GUC explained that the chemistry lab, which is also used by pharmacy courses, is conducted after the spring semester and therefore the workload is not displayed accordingly. Nevertheless, the expert group wishes to encourage the GUC to further investigate possibilities of better balancing the effective workload of students.

The recommendations of the 2013 accreditation for increasing the share of electrical engineering modules has not been implemented. The GUC explained that the mechatronics program is a limited programme with a larger focus on mechanical engineering. As the curriculum includes already several courses focusing on electrical engineering and taking into account the mathematical background of GUC students, the GUC regards the current share of electrical engineering as sufficient. The expert group accepts this rationale, although it should be noted that innovation in mechatronics is driven considerably by synergies between electrical engineering and information technologies.

Practical projects in the first semesters are conducted in teams and performed mainly in computer science (programming). The GUC claims that in almost all courses group projects are included. This could be further highlighted in the module descriptions.

The mechatronics labs are interdisciplinary, organised jointly by two or three professors and used primarily for experiments as part of the Bachelor's theses, which is much appreciated by the students.

The GUC reports that the training and usage of state-of-the-art engineering computer tools, e.g. Matlab/Simulink, is included in several courses instead of one dedicated course on modelling and simulation. As model-based engineering becomes more and more important with digitalization (Industry 4.0, cyber-physical systems, internet of things) it is emphasized that in future students will need to be familiarized with the concepts and mathematical peculiarities behind those tools and also enable the students to a critical view on the correctness resp. possible incorrectness of results from such tools.

The ECTS-Points of several (8) modules have been adapted since the previous accreditation.

Conclusion

The standard is fulfilled.

The expert group recommends:

- The calculated workload of the first two semesters should be displayed in a way that reflects the actual (balanced) workload.

Master

Documentation

Since the Egyptian Bachelor degree (as opposed to the international Bachelor degree) requires five years of full time study, the GUC regards its Bachelor and Master programme as a coherent unit. The Master programme however consists of three semesters in which the students will complete 14 modules.

Semester 9:

Robotics (6 ECTS-Points), Advanced Mechatronics Engineering (7 ECTS-Points), Sensor Technology (5 ECTS-Points), Legislation, Contracts and Engineering Ethics (2 ECTS-Points), Elective 1 (5 ECTS-Points), and Elective 2 (5 ECTS-Points).

Selectable Electives are: Vehicle Dynamics; Heating, Ventilation and Air Conditioning (HVAC); Systems and Control; Electro-Hydraulics; Nonlinear and Adaptive Control; Image Processing for Mechatronics; Continuum Mechanics; Vibration of Structures; Nonlinear Dynamics; Selected Topics in Engineering Mechanics, and Turbomachinery.

Semester 10:

Autonomous Systems (6 ECTS-Points), Project Management (4 ECTS-Points), Elective 1 (5 ECTS-Points), Elective 2 (5 ECTS-Points), Elective 3 (5 ECTS-Points), and Elective 4 (5 ECTS-Points).

Selectable Electives are: Modelling MEMS and NEMS; Selected Topics in Mechatronics; Electric Drives; Neural Networks; Cooling of Electronic Systems; Optimization Techniques in Mechatronics; Renewable/Sustainable Energy Technology; Modelling and Simulation of Electrohydraulic Systems; Digital Control; Robust and Optimal Control; Advanced Finite Elements Methods for Mechatronics; Visual Servoing; Medical Robots; Mechatronics Programming for Real-Time Systems; Industrial Sensors and Applications; Cyber-Physical Systems; Aerodynamics; Aeroelasticity; Systems on a Chip; Artificial Intelligence, and Design of Experiments and Measuring Techniques.

Semester 11:

Master Thesis (30 ECTS-Points).

The contribution to knowledge of a Master's thesis can be in the nature of an incremental improvement in an area of knowledge, or the application of known techniques in a new area.

Assessment

The Master's programme at the GUC consists of three semesters, with the first two semesters offering six mandatory and six elective courses, containing several practical projects. The students can also study suitable electives abroad and receive credits for their Master studies respectively.

The third semester consists of the Master Thesis. The course portfolio of the Master programme is well balanced and offers up-to-date research and technology topics.

In contrary to the bachelor programme, the master program offers considerable specialization opportunities due to various elective courses. In the previous accreditation focused areas or tracks for elective courses were recommended. The GUC responded that three directions of tracks, namely *robotics*, *renewable energies*, and *control* have been implemented. Since these tracks are not visible in the curriculum documentation, a clear and transparent description of the tracks and associated elective courses would be desirable.

Also, a couple of new courses were added recently, offering up-to-date scientific topics, which is appreciated by the expert group.

However, after reviewing the module catalogue, the expert group would like to suggest the following changes:

- renaming the module Advanced Mechatronics (MCTR 903) according to its content Embedded Systems,
- adding the content assessment policy to the module Selected Topics in Mechatronics (MCTR 905)
- renaming the module Visual Servoing (MCTR 1013) according to its content Machine Vision for Robotics,
- renaming the module Cyber-Physical Systems (MCTR 1019) according to its content Hybrid Discrete Event and Continuous Dynamics,
- adding the amount of ECTS-Points calculated for a) thesis writing, b) thesis presentation as well as c) the supporting research course separately (cf. recommendation for Bachelor Thesis in chapter 2.2.5)
- revising the table “Mapping of Mechatronics Master’s Program Outcomes and Courses Learning Outcomes” on page 194-195 of the module catalogue, since it seems to be incomplete.

Conclusion

The standard is fulfilled.

2.2.2 Mobility

Documentation for both study programmes

In line with the GUC programme objectives to have their graduates become open to foreign expertise and cultures in order to enrich the technical and human cultural knowledge, GUC encourages students' exchange and gives the students a chance to complete their bachelor and/or master thesis at the German partner universities. In addition, the GUC had inaugurated the GUC Berlin Branch in 2012 to facilitate future students' and academics' exchange between Cairo and Germany.

Since the GUC constantly aims for their graduates to be open to foreign expertise and cultures in order to enrich technical and human cultural knowledge, it strongly encourages students' exchange and supports the possibility of completing the bachelor and/or master thesis at a German partner university.

Furthermore, GUC arranges summer courses, internships, and trips in Germany to allow its students to learn more about and get familiar with the German culture. More than 22 % of all students travelled

to Germany over the past 5 years to write their bachelor thesis, participate in study courses or internships, and improve their German language skills. The students can choose from more than 66 cooperating German Universities and institutions.

On the other hand, GUC regularly receives German students, mainly from universities in Baden-Württemberg. In addition, in 2007 the GUC inaugurated its own Guest House in Ulm and in 2012 a GUC Berlin Branch, which facilitates the exchange between Cairo and Germany for both students and academic staff. Another purpose of the GUC branch in Berlin is the promotion of international activities on professional level by offering study semesters for GUC students, hosting research events, tapping into new fields of applied and theoretical research, and other activities that would foster the next generation of research and researchers.

Transfer students from other higher education institutions are accepted at GUC, provided that they meet the following:

1. They fulfil GUC regular admission requirements including the attainment of high school certificate (Al-Thana-weya Al-Amma or its equivalent) with a score complying with the Supreme Council of the Egyptian Universities regulations for the year during which this certificate was obtained.
2. Submit Official records (Official Transcript) of the courses taken with detailed course descriptions stamped from an accredited university - including the credit hours and grades achieved.
3. Comply with GUC admission requirements including passing the admission tests (the reasoning and the English Language tests) and obtaining the qualifying subjects for the required field of study.
4. Submit the brochure / Catalogue of the institution.

Assessment

Through the presentation of the university and the reports of the students, the expert group can confirm that mobility is one of the key components of the study course at the GUC. The aim of the university is that all students visit Germany at least once during their studies, may it be for summer schools, internships, or exchange semesters. While the former is available for all students during the whole time of their studies, the latter is especially enforced in the 9th and 10th Semester (1st and 2nd semester of the Master programme). These semesters mainly consist of elective courses, therefore courses taken abroad can be easily recognized, as university representatives and students confirmed during the interviews. Since all students attend these semesters to obtain the Egyptian bachelor's degree, a designated mobility phase is open for all students. Furthermore, the internship placed in the 7th semester offers the possibility to go abroad, which is actively enforced by the university administration. The GUC maintains several partnerships with German institutions, but students are also offered a variety of other international

partnerships, mainly with universities in English speaking countries. Therefore, the reviewers conclude that the curriculum offers excellent possibilities for individual mobility phases for all students.

Despite this support by the university, only 22 % of the students actually go abroad. The mobility rate is thus significantly smaller than the self-defined goal. As the principal reason the university points to the financial situation of the students. Although scholarships are offered, the influence of the administration on this factor is limited. The reviewers therefore acknowledge the visible effort of the GUC and encourage them to continue pursuing their aims.

After finishing the 10th Semester (2nd semester of the master programme) the students obtain the Egyptian Bachelor and can either continue their studies at the GUC to obtain the international master's degree or go abroad for an international Master. Students pursue both possible paths to achieve their goals. Furthermore, students go abroad either to work or to start a PhD in another country after obtaining the master's degree at the GUC. Due to the solid language bases, which are obligatory for all students, the study program enables students also to a post-study mobility.

For incoming students, the GUC offers different possibilities and support for mobility phases in Cairo, although due to the political situation since 2010 less foreign students choose to come to Egypt. This again is outside of the universities purview and the reviewers therefore acknowledge the possibilities and support still offered by the university.

Conclusion

The standard is fulfilled.

2.2.3 Staff

Documentation for both study programmes

The overall vision of the GUC is to build a distinguished centre of excellence in teaching and research that extends beyond the regional borders. The university is planning to achieve this by selectively appointing staff members with an established national and international reputation from both sides (German and Egyptian), who additionally pursue advanced study and research in their particular academic field in accordance with the research plans of the departments.

The GUC Selection Committee criteria therefore include the following aspects:

- Teaching, with special regard to the development of the discipline through innovation and academic leadership.
- Research, as evidenced by scholarly publications, research supervision, and successful winning and completion of research grants and contracts; with recognition of innovation, versatility, leadership and management.

- External contribution, with special regard to involvement in professional bodies, consultancy activity, acting for professional journals, service with Research Councils and other bodies connected with higher education, membership of governing bodies or community bodies relating to education, seminars and invited lectures, and liaison with other institutions.
- Multicultural experience.
- The reputation at national or at international level.

Furthermore, the GUC is committed to staff development as an integral part of its commitment to delivering high quality teaching and research activities and strongly encourages its academic staff to take part in periodical training and development programmes to meet teaching and research needs. Newly appointed full-time members as well as continuing Egyptian and German academic staff receive training by the standard and assessment center.

The faculty of Engineering and Materials Science (EMS) is led by the faculty dean, two vice deans, and it consists of three academic departments, namely: Materials Engineering Department (MATS), Design and Production Engineering Department (DPE), and Mechatronics Engineering Department (MCTR). Each department is headed by a professor or an associate professor. There are different research groups within each department.

Currently, the number of academic staff members in the Faculty of Engineering and Materials Science is 82 staff members (11 Professors, 3 Associate Professors, 13 Ph.D. holders and 55 Teaching Assistants – 48 of them are GUC graduates).

In order to provide appropriate language classes, the GUC employs 7 English language instructors and 3 German language instructors.

In line with its vision and mission, the GUC considers its staff valuable key to success. Hence, the human resources department is aiming at assembling a workforce consisting of highly qualified non-academic staff by continuous training and development. Staff members undertake general and specialized individual training upon identification of his/her needs for improvement through regular evaluation and assessment. The GUC also offers regular staff trainings on standard software programmes, presentation techniques, behavioural techniques etc.

Assessment

Sufficient staff is available to pursue the current course of study. Academic staff is entitled to qualified training, which is offered on a regular basis. New professors are recruited through a process similar to the German procedure to fill vacancies. In this process, vacancies for professors are advertised nationwide and in the international press. A committee of professors and German Cooperation partners select suitable candidates, whereas students and assistants evaluate the candidates' presentations.

The procedure, as established at GUC, ensures that the best professors are found. More intensive advertising and networking may be necessary for attracting international staff in competition with other universities and headhunters.

Conclusion

The standard is fulfilled.

2.2.4 Resources

Documentation for both study programmes

Currently, the Mechatronics Engineering Department of the EMS Faculty has several laboratories to serve the practical part of the taught courses and to enhance students' hands-on experience. There are labs for undergraduate studies and advanced labs for postgraduate studies and research. The available labs are as follows: Mechatronics Engineering Lab, Industrial Automation Lab, Multi-Robot Systems Lab, Medical Micro and Nano Robotics Lab, Control and Dynamical Systems Lab, Computational Mechanics Lab and IHA Electro-Hydraulic Training Center.

All labs are designed to accommodate 25 students per class, at maximum, and equipped with advanced lab kits that are connected to personal computers to allow the lab instructor to perform different levels of experiments according to the level of the course.

Numerous licensed engineering software are installed on the Mechatronics laboratories' computers to help the students in performing simulations related to their study (LabVIEW, Mathematica, Matlab, Ansys, Automation Studio, Solid Works, 20-sim, Fluidsim, MikroC, MPLab, AutoCAD, NI Multisim and Ultiboard software for a complete circuit design, Robot Operating System (ROS), NetBeans 3.6 Java IDE, OpenCV).

Examples of the used lab kits are: the Data Acquisition Card (DAQ), CompactRIO, and Electronic Bread Board. The advanced labs are used to conduct experiments for postgraduate courses of the 9th and 10th-semester students and for postgraduate research.

The GUC Library offers a variety of collections including textbooks, periodicals, references, online databases, also CDs that cover different disciplines and books in different fields. Available collections are in German, English, and Arabic language as well as a small collection in French. The library is a member of the South-West Library Association in the State of Baden-Württemberg in Germany, the Egyptian Libraries Association, and the International Committee of Libraries in Egypt. It connects with the KIZ online library Ulm, where GUC staff and students are recognized members of the network and able to use services (especially e-journals). The library also connects with the Egyptian Universities Online Network

and has access to most major online databases. The library provides 200 seats and accessibility to more than 2.000 PCs directly connected to the Library.

The GUC IT Center maintains a wireless and wired network for fixed computers as well as students' devices with 100 % coverage in lecture halls and classrooms. Furthermore, GUC offers computer labs on campus as well as design-specific laboratories, studios, and workshops.

Assessment

The resources at the GUC were presented comprehensively during the online discussions. Also, one member of the expert group visited the GUC in the previous accreditation.

The resources at the GUC are very good, especially with respect to equipment and latest technologies. This way, all students are empowered to gain hands-on experience in many subjects. The industrial park offers facilities that can be used in cooperation between researchers, students, and industry, which is a unique characteristic of the GUC.

Conclusion

The standard is fulfilled.

2.2.5 Examinations

Documentation for both study programmes

The following types of examination are implemented in the study programmes:

- Course work includes assignments, seminars, projects, and presentations. The total grade of course work should not carry weight more than 30 % of the total course grade if quizzes, mid-term, and final term exams exist,
- Quizzes: A 10 to 20 minutes exam or computer-based test that may be conducted before the mid-term and the final exam, according to the course requirements. Pop quizzes may be given from time to time with a range of 2 to 4 quizzes per semester. The total grades of the quizzes should not carry weight more than 20 % of the total course grade, if course work, midterm, and final term exams exist,
- One mid-semester exam that covers approximately half of the course material. The grade of this exam should not carry weight more than 30 % of the total course grade if quizzes, assignments, and final term exam exist,

- Final examination: is to be conducted during the last two weeks of every semester. The grade of this exam should not weigh more than 50 % of the total course work if quizzes and midterm exam exist.

Assessment

The reviewers learned that students are continuously assessed during the courses by different types of exams. Quizzes seem to be a dominant form of learning assessment, alongside projects, midterm exams and module exams. However, the module descriptions so far do not clearly indicate the amount of practical work or projects being part of the exams and the final grade of a course. Members of the academic staff state, that quizzes can have various forms and might be short practical work / projects as well. Although students are informed about the different types of exams at the beginning of a course, they do not always know which type of exam involves which type of competences. The expert group concludes that a definition of the different types of assessment within the study regulation could provide clarity. With regard to the transparency concerning the distribution of ECTS points in the Bachelor module, the GUC should differentiate more precisely between thesis writing, thesis presentation and the supporting research course.

Conclusion

The standard is fulfilled.

The expert group recommends:

- For better transparency, the study regulation should contain a definition of all examination methods.
- With regard to the transparency concerning the distribution of ECTS points in the Bachelor module, the GUC should differentiate more precisely between thesis writing, thesis presentation and the supporting research course.

2.2.6 Student-centred learning

Documentation for both study programmes

Both reviewed study programmes are under the supervision of the faculty of Engineering and Materials Science. The Faculty Council comprises the dean and the vice dean for academic affairs, who supervises the study programme directors and the vice dean for student affairs. The academic coordinators for each study programme are responsible to the dean and the respective study programme directors. Several faculty committees support the Faculty Council.

For the Bachelor and Master program, students' curriculum committees are implemented as an internal quality assurance instrument. The committee usually meets twice per month to gather the students' feedback regarding course content, teaching methods, assessment methods, student workload per course, course prerequisites, repetition and redundancy of courses or topics, etc. The students' feedback is an ongoing process. Additionally, an advising council is responsible for the students of each programs. The major aim of this advising process is to support students struggling to follow the regular track. At the beginning of each semester, these students are encouraged to meet with their advisors in order to discuss their academic situation and advise them on an efficient plan to graduation.

The GUC provides the following counseling services:

- Counselling services for high school students regarding admission procedures and choice of areas of study,
- Assisting new entrants to make first steps at the GUC including orientation programmes,
- Information on courses at all faculties.

In 2011, the Review Committee arose from the requirement to enhance the handling of students' complaints and to speed up the handling process. The head of the committee is the GUC vice president for students' affairs. The members are representatives of different departments: complaint center, examination office, students' affairs, finance, coordinators and Quality Management and Accreditation Committee (QMAC). The Review Committee's main task is to revise existing policies, propose amendments to running policies and recommend new policies based on students' complaints (if needed). QMAC representatives participate in committee meetings in order to solve problems related to ECTS-points, students' workload, etc. The QMAC executive committee played a major role in initiating and sustaining the mentoring system. The mentoring system started in 2011 as a pilot project to provide help and support for students facing difficulties regarding their progress in the study programme, effecting their graduation as well as their GPA. The QMAC team together with volunteering academic members and teaching assistants offered academic and administrative support to these students.

The Students Careers and Alumni Development Office (SCAD office) aims to help GUC students to determine career goals, identify and find appropriate employment in the fields of their specializations whereby they can progress in their development as individuals and as constructive members of society. To achieve this aim, the SCAD office organizes activities towards cooperation and partnership with the industry in order to offer internships, fieldwork, development and employment opportunities.

Assessment

The expert group finds the study program to be student-centred, which is especially visible by the high involvement of students in organisational matters of the student program. The central point of student involvement is the biweekly meeting of the curriculum committee. Rather chronicle problems within the

curriculum, such as an accumulation of workload or the adaptation of assessment criteria were recently solved through the curriculum committee. However, the selection of the students in the curriculum committee is not fully transparent to the reviewers and could be based on a democratic decision of the students themselves in the sense of self-representation.

The program at the GUC is very labour intensive, as professors and students confirm. However, through the continuous learning process and even distribution of the workload over the semester, the students are able to keep up with the high pensum. A revision week before the period of the final exams offers time for preparation. The exams are evenly distributed over the examination period. If students fail an exam, they can either retake it in the next semester, or during the summer. When students fail twice, they have to retake the entire course leading to subsequent prolongation of their studies, which is, however, a rather rare case. Particularly worth mentioning is the support for low-achieving students. As a private university, GUC also offers individual support on a fee-paying basis. The number of dropouts, but also the number of failed exams, is thus reduced to an astonishingly low level. An over assessment is practiced in the program leading to a high number of exams (assignments, midterms, finals, projects, quizzes). According to the university management this is intentional and leads to an even distribution of the self-study workload. The students confirm and agree with this strategy. As the distribution of all exams is communicated and fixed in coordination with the students through the curriculum committee, peaks in the workload can be avoided. Additionally, the ECTS of some courses were recently adjusted to fit the corresponding workload. According to the students, an appropriate scope is defined for the research projects, especially the bachelor thesis, prior to the start of the project and prolongations are not necessary, but possible in case of unswayable events. Overall, the expert group appreciates the continuous effort to ensure a bearable workload and does not see any need for further action.

Although the exam conditions were not transparent to the reviewers at first sight, professors and students assured them that the conditions are transparently communicated at the very beginning of each semester. Individual regulations for students on sick leave apply.

The complaint centre and the academic coordinator are further responsible to resolve urgent matters which can be brought to their attention by every student. The academic coordinator is also in charge of organising resources for the students, such as software, and supports students with individual struggles to help them to cope with their studies.

According to the students, sufficient learning resources are available, students can study in the library and lecture rooms can be used for group assignments or study groups. During the pandemic, a fast switch to online courses was performed, while now most courses are held in a hybrid format to provide access for all students.

The expert group gained the impression that the university is both very keen to meet the students' needs and not afraid to actively involve the students in the development of the study program. They therefore conclude that student-centred learning is fully applied.

Conclusion

The standard is fulfilled.

2.2.7 Particular Profile

(not relevant)

2.3 Further Development

Documentation for both study programmes

As part of the GUC mission of enhancing the research and creative activities and keeping up with innovations in science and research, the GUC encourages full-time academic staff to attend conferences on national but also international level.

The research in the Mechatronics Engineering Department covers major areas of electro-mechanical engineering research – namely: mechanical engineering, electronics, computer, and control in Mechatronic systems. The research Profile of Mechatronics Department is based on forming several research groups (clusters). Each group has its own research track. The members of each cluster can cooperate with other researchers either in Egypt or abroad (priority for Germany).

The following research topics have been of special interest:

- Medical Micro & Nano Robotics
- Control and Dynamical Systems
- Sensors and Actuators Technology
- Micro-optical Sensors Technology
- Biomedical Instrumentation and Robotics
- Robotics and Autonomous Systems
- Electro-hydraulic systems
- Machine Vision
- Renewable Energy

Several members of the faculty of EMS have conducted research stays in Germany as part of their running DAAD-BMBF funding and the GUC-DAAD mobility fund and have been actively engaged with research activities with an outcome of several publications.

Assessment

Representatives of the GUC assure that the contents of the modules are constantly adapted to the development of science and technology. Impulses for this result from research, industry contacts, visiting professors, scientific journals, conferences, student impulses and more.

Several mechanisms are implemented to constantly adapt the module content. These include the semester-by-semester evaluations of the courses, showing possible need of further development. The curriculum committee also receives suggestions for improvement and forward these straight to the lecturers. Lecturers are being evaluated as well, and it is therefore in their own interest to follow up on new trends and to include them in the modules. The most flexible way of integrating new content provide the elective courses in the first two semesters of the Master's programme. Students are involved in the faculty's research by taking on project work and thus gaining experience in research work.

The design of courses had to change abruptly due to the pandemic. Online courses were developed quickly, and online resources were made available. For the future, however, representatives of the teaching staff confirm that face-to-face teaching remains the best form of teaching. Current challenges were seemingly mastered very well, however, new forms of teaching are not certain to be consolidated in the future.

The large volume of evaluation measures leads to the constant optimisation of teaching, but also implies noticeable pressure on those involved to aim for good results.

Conclusion

The standard is fulfilled.

2.4 Quality Assurance

Documentation for both study programmes

GUC is committed to the quality and the standards of the education offered. The university adopts a system of continuous monitoring, review, and evaluation of all programmes to ensure the quality and standards of teaching and learning. The aims of the system are:

- To ensure that each programme is planned, operated, and developed adequately to achieve the educational objectives as well as to ensure consistency of the educational objects with the university's overall goals,

- To convey qualifications in line with the needs and requirements of the labour market,
- To monitor and ensure the progress of the study programme towards the desired objectives,
- To review and evaluate the progress and future development of the programmes,
- To make use of peer reviewing in developing and continuously improving the quality of the study programmes by utilizing a wide range of expertise, both internal and external as well as German and Egyptian.

The Quality Management and Accreditation Committee (QMAC) re-arranged its already existing structure to be a “QMAC Board Level Committee” (initiated in 2010) supervising two centers and sharing all the stated responsibilities and activities with focus on specific tasks:

1. “ECTS Coordination Center”:

- To deal with the academic and administrative aspects of ECTS,
- To enhance and facilitate the implementation process of ECTS,
- To ensure the commitment of the institution to ECTS principles and mechanisms,
- To promote ECTS both within the institution and outside, e.g., within international cooperation programmes,
- To introduce new courses and programmes aligned with ECTS guidelines.

2. “Quality Assurance and Accreditation Center”:

- To apply and enhance the processes of development, implementation, ongoing monitoring, documenting, and continuous improvement of programmes,
- To evaluate the programmes to detect their strengths and weaknesses and the elements necessary for generating study programmes of high quality,

The Quality Assurance and Accreditation Center established eight new units inside the GUC faculties headed by a quality representative from the faculties’ staff. They act as a link between the center and the faculties in delivering all the messages and monitoring the quality activities.

In March 2019, a new quality position, Vice Presidency for Quality, has been initiated under the structure of the QMAC. To maintain a high level of educational quality and to enhance learning, different quality concepts such as quality management (QM) and quality assurance (QA) became a crucial necessity for higher education institutions (HEI).

The “Fresh Graduate Survey” is distributed to fresh graduates after the graduation ceremony where they evaluate their undergraduate experience, programme outcomes, quality of instructions, and overall satisfaction. Graduates can also give information about their career plans. The “Alumni Survey” focuses

on different aspects to provide insights about university quality improvements areas as well as measuring alumni experiences and satisfaction, whereas the “Employer Survey” focuses employers’ feedback and possible improvements. Additionally, the “External Evaluation Report” of a study programme asks external evaluators about the course files’ content, including: course specifications, course report, course statistics, student feedback, lectures, tutorials, assignments, quizzes, mid-term and final exams with model answers and tables of exam specifications.

The GUC is continuously monitoring its students’ progress throughout their studies via the Students Electronic Administration System as a measure of success. If a student achieves satisfactory results, the GUC regards this as an indicator that a student has reached the associated programme objective. The data collected by the Students Electronic Administration System enables continuous self-evaluation and measure their academic progress. This way, the course instructors can evaluate their students’ performance during the semester and detect deficiencies at an early stage to take counter measures like additional lectures, tutorials, or office hours if necessary.

The evaluation of a study programme also takes graduation rates, average scores as well as the evaluation of the Bachelor thesis into account. The GUC compares evaluated data of different times and calculates programme performance indicators to give information on trends to determine whether the programme is fulfilling its outcomes and the needs of its constituents. This also reveals strengths and weaknesses of the programme, as well as the effect of changes.

Assessment

The processes of continuous monitoring of the study programmes are subject to the central quality management cycle. The study 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 GUC represents a closed loop. The expert group regards this process as suitable for further development of the study programmes in the Mechatronics Engineering department.

The discussion with the students showed that feedback on the results of the evaluation as well as measures of improvement are shared with the students. Data security aspects are taken into account.

Therefore, the expert group concludes that the students are involved in the development of the study programme in a suitable way. Direct contact with the lecturers also creates a feedback opportunity that supports the efficient design of the study programmes.

The GUC has a well-established system when it comes to quality assurance in the study programs. A further positive aspect is the creation of a vice president position for quality management in order to make the topic more transparent within the GUC.

According to the information of the GUC given during the discussions, one ECTS-Point equals the workload of 30 clock hours. For transparency reasons, this should be defined in the study regulations.

Conclusion

The standard is fulfilled.

The expert group recommends:

- The study regulations should contain the definition that one ECTS-Point equals the workload of 30 hours.

2.5 Gender Equality and Diversity

Documentation for both study programmes

The GUC is open to all men and women without regard to race, ethnicity, or disability. It offers a balanced range of scholarships to outstanding students during the years of academic study with the purpose of attracting and retaining highly qualified students as well as giving incentives to students for maintaining high standard of academic achievements. In cases of serious financial difficulties (force majeure), GUC can offer financial aid following a thorough inquiry on the social status conducted by the special committee in charge.

Furthermore, the GUC welcomes students with special needs and long-term medical conditions and provides additional services and facilities, including special examination arrangements in individual cases and ramp access to buildings, wide door elevators and sanitary facilities on campus. Students with special needs are also encouraged to visit the GUC before applying, in order to inspect the facilities provided by the university.

In addition, the department aims at providing high quality guidance, information, and support by offering the following services:

- Student Counselling Services
- Students Career and Alumni Development services
- Internships and Student Exchange Programmes
- International Students Services
- Accommodation Services
- Clinic
- Transportation Services
- Students with Special Needs
- Extracurricular Activities

- Sports Facilities and Services

Assessment

All students at the GUC receive appropriate support to meet the requirements of the study programmes. Through various scholarships and the GUC selection process, a certain diversity is achieved among the students, which is very much appreciated. Compensations for students with a disability or other disadvantages are granted and organised by the academic coordinators. Further support in special circumstances can be provided by the mentoring committee.

The reviewers acknowledge that a significant percentage of the teaching staff is female and can act as role models for young female students. The university is furthermore proud that with 12 % the rate of female students is comparatively high on a national level for mechatronics engineering. The reviewers explicitly appreciate this circumstance. However, the university could define goals for further development regarding the rate of female students and staff members. For instance, the implementation of a monitoring process could help identify further potential for development and take an active role in the further implementation of gender equality.

Conclusion

The standard is fulfilled.

IV Review Procedure

1 General Remarks

- This report has been created in reference to the MRVO (Musterrechtsverordnung gemäß Artikel 1 – 4 Studienakkreditierungsstaatsvertrag).

2 Legal Framework

- Standards and Guidelines for Quality Assurance in the Higher Education Area (ESG 2015)
- ECTS Users' Guide (2015)

3 Expert Group

- **Prof. Dr. Catherina Burghart**; Hochschule Karlsruhe – Technik und Wirtschaft, Studien-
dekanin Master Mechatronik, Professur für Angewandte Informatik
- **Prof. Dr. Klaus Janschek**; TU Dresden, Professur für Automation Engineering
- **Prof. Dr. Manfred Lohöfener**; Hochschule Merseburg, Professur für Mechatronische Sys-
teme
- **Fred Härtelt**; Bosch Engineering GmbH, Fachreferent Zentrale QM-Koordination
- **Daniel Irmer**; PhD student at École de MINES ParisTech

V Decision of the ACQUIN Accreditation Commission

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 28 June 2021:

The study programme „Mechatronics Engineering“ (B.Sc.) is accredited without any conditions.

The accreditation is valid until 30th of September 2027.

The following recommendation is given for the further development of the study programme:

- Recommendation 1: The calculated workload of the first two semesters should be displayed in a way that reflects the actual workload distribution.

The study programme „Mechatronics Engineering“ (M.Sc.) is accredited without any conditions.

The accreditation is valid until 30th of September 2027.

The following recommendations are given for the further development of both study programmes:

- Recommendation 2: For better transparency, the study regulation should contain a definition of all examination methods.
- Recommendation 3: With regard to the transparency concerning the distribution of ECTS points in the Bachelor module, the GUC should differentiate more precisely between thesis writing, thesis presentation and the supporting research course.
- Recommendation 4: The study regulations should contain the definition that one ECTS-Point equals the workload of 30 hours.