



ASIIN Seal

Accreditation Report

Bachelor's Degree Programmes

Biology

Chemistry

Microbiology

(Male Campus)

Provided by

University Umm Al-Qura, Saudi Arabia

Version: June 28th 2019

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A About the Accreditation Process

| Name of the degree programme (in original language) | (Official) English translation of the name | Labels applied for ¹ | Previous accreditation (issuing agency, validity) | Involved Technical Committees (TC) ² |
|--|--|---------------------------------|---|---|
| بكالوريوس العلوم في علم الأحياء | Bachelor of Science in Biology | ASIIN | - | 10 |
| بكالوريوس العلوم في الكيمياء | Bachelor of Science in Chemistry | ASIIN | - | 09 |
| بكالوريوس العلوم في علم الأحياء الدقيقة | Bachelor of Science in Microbiology | ASIIN | - | 10 |
| <p>Date of the contract: 14.04.2017</p> <p>Submission of the final version of the self-assessment report: 08.11.2017</p> <p>Date of the onsite visit: 13.12. – 14.12.2017</p> <p>at: Makkah (male campus), Saudi Arabia</p> | | | | |
| <p>Peer panel:</p> <p>Prof. Dr. Gert Fricker, University of Heidelberg</p> <p>Prof. Dr. Jens Hartung, Technical University Kaiserslautern</p> <p>Dipl. Bio. Peter Nießlbeck, bioConsult, Munich (desk top review)</p> <p>Prof. Dr. Hans-Joachim Wagner, University of Tuebingen</p> | | | | |
| <p>Representative of the ASIIN headquarter:</p> <p>Rainer Arnold</p> | | | | |
| <p>Responsible decision-making committee:</p> | | | | |

¹ ASIIN Seal for degree programmes;

² TC: Technical Committee for the following subject areas: TC 09 – Chemistry; TC 10 – Life Sciences

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|---|--|
| Accreditation Commission for Degree Programmes | |
| Criteria used: European Standards and Guidelines as of 15.05.2015 ASIIN General Criteria as of 28.03.2014 Subject-Specific Criteria of Technical Committee 09 – Chemistry; as of 09.12.2011 Subject-Specific Criteria of Technical Committee 10 – Life Sciences as of 09.12.2011 | |

B Characteristics of the Degree Programmes

| a) Name | Final degree (original/English translation) | b) Areas of Specialization | c) Corresponding level of the EQF ³ | d) Mode of Study | e) Double/Joint Degree | f) Duration | g) Credit points/unit | h) Intake rhythm & First time of offer |
|-------------------------------------|---|----------------------------|--|------------------|------------------------|-------------|-------------------------------|--|
| Bachelor of Science in Biology | Bachelor of Science in Biology | - | 6 | Full time | no | 8 Semester | 141 credit hours (249 ECTS) | Fall Semester 1981 |
| Bachelor of Science in Chemistry | Bachelor of Science in Chemistry | - | 6 | Full time | no | 8 Semester | 137 credit hours (226 ECTS) | Fall Semester 1982 |
| Bachelor of Science in Microbiology | Bachelor of Science in Microbiology | | 6 | Full time | no | 8 Semester | 134 credit hours (228.5 ECTS) | Fall Semester 1982 |

³ EQF = The European Qualifications Framework for lifelong learning

For the Bachelor's degree programme Biology University Umm Al-Qura has presented the following profile in the Self-Assessment Report:

“The objective of biology study program is to educate professionals in the field of biology. Students should develop general skills for acquiring, analyzing and synthesizing fundamental concepts related to natural sciences and biology. In addition, students develop skills for application of the gained knowledge and efficient laboratory skills. Upon completion of the course of study in biology students are qualified for work in sectors such as industry, agriculture, medicine and other sectors where biological knowledge and skills can be applied. They are also qualified for work in research and development laboratories as well as in institutions for nature conservation.

The degree program in biology offers the student's possibilities to understand the basic biological processes common to all organisms in order to understand the world. The objective of program is that the students will demonstrate adequate knowledge about the important biological processes, particularly those at the molecular, cellular, and ecosystem levels. The major undergraduate courses in biology (Bachelor of Science, B.Sc. Degree) serve as a basis for postgraduate study in the life sciences. School of life sciences graduates have gone on to advanced graduate study, leading to careers in faculty or university teaching, basic and applied research, and public health. Other graduates have gone directly into secondary (high school) science teaching, the biomedical industry, independent laboratory research, natural resources management, or environmental education.

Biological sciences undergraduate degree program aims to diversely train its students, enabling graduates to pursue careers or advanced degrees in life and health sciences, research, industry, or governmental work. Biology program is designed to give students broad knowledge in all biological disciplines that include: environmental pollution, molecular biology, biotechnology, plant and animal ecology, plant taxonomy, comprehensive biology and evolutionary biology. All biology undergraduate students must complete a minimum of 137 credit hours.”

For the Bachelor's degree programme Chemistry University Umm Al-Qura has presented the following profile in the Self-Assessment Report:

“Vision of Chemistry Department

To make up for shortfall in the job market and training in the field of chemistry to promote our country in the fields of education, scientific research and industry through providing high quality education in line with international standards and principles.

Mission of Chemistry Department

To prepare a generation of qualified national scientists and researchers to meet the needs of the job market, and to effectively contribute in solving scientific and industrial problems facing the development plans in the Kingdom of Saudi Arabia.

Objectives of Chemistry Department

- Graduating competent and specialized national scientists required to serve the community and the development plans, programs, education and industry in the Kingdom.
- Conducting academic and applied scientific research.
- Contributing to the dissemination of scientific awareness through organizing scientific conferences and symposia.
- Providing technical services in the field of chemistry for the public and private sectors.”

For the Bachelor’s degree programme Microbiology University Umm Al-Qura has presented the following profile in the Self-Assessment Report:

“The objective of Microbiology program is to educate professionals in the field of Microbiology. Students should develop general skills for acquiring, analyzing and synthesizing fundamental concepts related to natural sciences and Microbiology. In addition, students develop skills for application of the gained knowledge and efficient laboratory skills. Upon completion of the courses of the Microbiology program, the students will be qualified for work in sectors such as applied industry, agriculture, medicine, food factories and quality control, education, water companies and other sectors where microbiological knowledge and skills can be applied. They are also qualified for work in research and development laboratories as well as in institutions for nature conservation.

The degree program in Microbiology offers the student’s possibilities to understand the basic microbiology and related fields in order to help and serve the society. The objective of program is that the students will demonstrate adequate knowledge about the important microbiological fields. For many, an undergraduate major in Microbiology (Bachelor of Science (B.Sc. Degree)) serves as a basis for postgraduate study in the Microbiology and life sciences. Microbiology graduates have gone on to advanced graduate study, leading to careers in college or university teaching, basic and applied research, and public health. Many have entered professional programs in food safety, environmental and public health. Other graduates have gone directly into secondary (high school) science teaching, the biomedical

industry, independent laboratory research, natural resources management, or environmental education.

The microbiology undergraduate degree program aims to diversely train their students, enabling graduates to pursue careers or advanced degrees in food quality control, public health, environmental sciences, research, education, industry, or governmental work. The microbiology program is designed to give students broad knowledge in all microbiological disciplines that include: molecular microbiology and biotechnology, food microbiology, water microbiology and medical microbiology, soil microbiology and environmental microbiology, industrial microbiology, bioremediation and biodegradation of pollutants. All microbiology undergraduate students must complete a minimum of 134 credit hours.”

C Peer Report for the ASIIN Seal

1. The Degree Programme: Concept, content & implementation

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

- Learning objectives of each degree programme according to the SAR (Self-Assessment Report) and the objective-module matrices
- Study plans of the degree programmes
- Module descriptions
- Webpage Umm Al-Qura: <https://uqu.edu.sa/en>
- Webpage Department of Biology: <https://uqu.edu.sa/en/dbiology>
- Webpage Department of Chemistry: <https://uqu.edu.sa/en/chmscimm>

Preliminary assessment and analysis of the peers:

The university informs about the vision, objectives and learning outcomes of the degree programmes at several institutional levels (university, college, department). Thus, the provided documentation is well suited to assess whether a respective set of learning outcomes does adequately reflect a given standard.

According to the programme objectives, the university aims at preparing students for current labor market needs. The main economic driving force in the region of Makkah arises from Hadj and Umrah. The influx of millions of pilgrims coming to Saudi Arabia every year creates an own industry and thus fields of employment. Examples of typical employment areas linked to Hadj and Umrah are, according to the programme coordinators, poison control, crowd management, food safety, and the prevention of infectious diseases.

The auditors base their assessment on learning outcomes provided on the website and in the Self-Assessment Report. For the degree programmes under review there are currently three active study plans. To provide a consistent assessment of the learning objectives in relation to the curriculum, the audit team concentrates on the study plan version 2016/17 (1437).

The auditors refer to the Subject-Specific Criteria (SSC) of the Technical Committee Life Sciences as a basis for judging whether the intended learning outcomes of the Bachelor's degree programmes Biology and Microbiology as defined by UQU correspond with the competences as outlined by the SSC. They come to the following conclusions:

Graduates of the Bachelor's degree programme Biology should understand the basic biological process and be capable of applying the scientific and technological methods of the biological sciences. In addition, graduates should acquire relevant scientific knowledge in the different biological areas such as botany, zoology, biochemistry, biostatistics, molecular biology, biotechnology, and related natural sciences (chemistry, physics). They learn to work in a team and to carry out practical work in a laboratory and in the field. The purpose is to educate biologists to competently solve scientific problems in biological laboratories or private companies.

The intended learning outcomes of the Bachelor's degree programme Microbiology focus on using of microbiological concepts and the organisation and function of organisms at the molecular level. Graduates in microbiology mainly aim at finding a suitable occupation in the health care sector.

With respect to the Bachelor's degree programme Chemistry, the intended learning outcomes include gaining expertise in natural sciences in general and majors in chemistry in particular: organic, inorganic, physical, analytical, and theoretical chemistry. In addition, graduates should understand major chemical concepts and be able to use laboratory techniques. Graduates should also be trained in experimental methods in chemistry, be aware of chemical hazards and how to prevent risks by applying appropriate safety tools, and have a sound knowledge of safety standards for preventing environmental problems. Finally, the graduates should be capable of conducting scientific work.

Graduates of the Bachelor's degree programme Chemistry have several job opportunities; they can work in the chemical, pharmaceutical, mining or petrochemical industry, at universities as well as in research institutes or in the public administration.

The information provided in the Self-Assessment Report and the supplementary information received from the programme coordinators, clearly shows that discipline-related skills are accurately outlined and competences are defined for the Bachelor's level agreeing with the respective Subject-Specific Criteria (SSC) of the ASIIN Technical Committee. The auditors are convinced that the intended qualification profiles of the degree programmes under review allow the students to find positions reflecting their qualification. The degree programmes are in many ways designed to meet the particular needs of the local and the national labour market. The auditors consider objectives and learning outcomes of the degree programmes appropriate for attaining the intended level of academic qualification.

The intended learning outcomes also adequately correspond with the ASIIN Subject-Specific-Criteria (SSC) of the Technical Committee 10 – Life Sciences (Biology, Microbiology) respectively of the Technical Committee 09 – Chemistry.

The Bachelor's degree programmes furthermore fulfill the qualification prerequisites as specified in the European Qualifications Framework level 6 (Bachelor).

The auditors recognize that the degree programmes under review are taught entirely (Chemistry) or in parts (Microbiology, Biology) in English. The curriculum, however, covers English only in two courses, having to suffice for the students to receive the necessary linguistic background in order to learn a scientific discipline in a foreign language. The respective learning outcomes, however, do not include any reference to international competitiveness of graduates or the ability to communicate in English as the internationally accepted scientific language.

Some of the above cited learning outcomes of the Bachelor's degree programme Biology are held in rather general terms. For this reason, the auditors recommend rephrasing the learning outcomes in a more detailed and programme-specific way.

State of the art Bachelor programmes in chemistry, however, are based on a number of guidelines specifying good practices: good laboratory practice (quality guideline), good scientific practice (ethical guideline), and sustainable chemistry (ecological guideline). Many universities teach fundamentals of these guidelines in separate courses preparing students for their final theses, which would be the "research project" in the programme under review. Good practice guidelines in parts are mentioned in the Self-Assessment Report, but are not apparent from module handbook.

According to the programme coordinators, the degree programmes aim at preparing students equally well for a scientific career and for work in industry or public administration. This requires gaining expertise in carrying out independent academic work, demonstrated, for instance, via a graduation project. Nevertheless, not all graduation projects reviewed by the auditors during the on-site-visit reflect an adequate scientific level (This is discussed in more detail under Criterion 3.).

During the discussion with the programme coordinators, the auditors learn that graduates wanting to pursue a teaching career in order to become a high school teacher have to enroll in a supplementary study programme, usually requiring an additional year of studies. The auditors learn from the employers that becoming a high school teacher is one of the major job perspectives for graduates. Alternatives to a career in schools are jobs in the private

sector, such as in medium-sized companies and in industry, for instance the petroleum industry. These alternative job perspectives are gaining in importance.

The auditors are pleased to note that UQU organizes annual meetings with relevant stakeholders for identifying possible deviations between the qualification profile of the graduates and the needs of the companies. Based on this information the auditors come to the conclusion that objectives and learning outcomes of all three degree programmes are adequately and regularly reviewed by the programme coordinators and further developed, if required.

Criterion 1.2 Name of the degree programme

Evidence:

- Self-Assessment Report
- Webpage Department of Biology: <https://uqu.edu.sa/en/dbiology>
- Webpage Department of Chemistry: <https://uqu.edu.sa/en/chmscimm>

Preliminary assessment and analysis of the peers:

The audit team considers all degree programme titles appropriate for reflecting the intended aims and learning outcomes, and the main languages the courses are taught in (Arabic and English). All information about the degree programmes is available from sources accessible to the students in Arabic and English.

Criterion 1.3 Curriculum

Evidence:

- Self-Assessment Report
- Study plans of all degree programmes
- Module descriptions
- Webpage Umm Al-Qura: <https://uqu.edu.sa/en>
- Webpage Department of Biology: <https://uqu.edu.sa/en/dbiology>
- Webpage Department of Chemistry: <https://uqu.edu.sa/en/chmscimm>

Preliminary assessment and analysis of the peers:

Information on the degree programmes is available from the internet pages of the involved departments. The auditors welcome that every departmental website entails the description of the curriculum. The chemistry curriculum is accessible via the Arabic-language internet portal of the Chemistry Department. However, not all courses / modules of the de-

gree programmes were documented by the time of the auditing visit on the website. Nevertheless, the curricula of all degree programmes under review were assessed on site, as the programme coordinators provided the audit team with printed module descriptions.

As outlined under criterion 1.1, the peers conclude from the information provided in the Self-Assessment Report and during the audit, particularly from reviewing sample exams and Bachelor's theses, that learning outcomes of the programmes match - minor limitations given – with the standards defined in the Subject-Specific Criteria (SSC) of the ASIIN Technical Committees for Biology and Chemistry.

The curriculum in chemistry offers aspects requiring a comment. Natural products chemistry, for instances, generally starts with carbohydrate chemistry, since fructose and glucose, being primary metabolites, are generally taught in the carbon pathway at the very beginning of natural products chemistry. Secondary metabolites are more demanding building blocks becoming understandable in the logic of biological chemistry more at the end of the natural products curriculum. UQU choses a different approach, beginning with more complex secondary metabolite chemistry in the sixth semester and teaching primary metabolites in the eighth semester. Quantum chemistry (third semester) is taught before students have learned principles of spectroscopy (fourth semester). In a world increasingly more relying on biochemical knowledge, students possibly take considerable profit from selecting courses in biochemistry and learning fundamental biochemical laboratory practice. In addition, the developing industry in the Kingdom of Saudi Arabia could take profit from graduates being educated in technical chemistry. Options for selecting from, biochemistry, technical chemistry and other chemistry related disciplines (toxicology, biophysics) could be valuable additions to the qualification profile making graduates even more attractive for the job market.

The audit team concludes that the imparted discipline-specific curricular content of all three programmes, minor exceptions given, reflects state of the art and is adequate for meeting demands on a Bachelor's level. The courses are suited for achieving the intended learning outcomes in a comprehensive manner, as specified in the module descriptions. The students interviewed by the peers during the audit stay stress that curricular content and learning outcomes match their expectations at the time of enrolment.

The auditors, however, have the impression from studying the module handbook that scientific skills should be stronger emphasized in the curricula and should be particularly stressed in the "research project". Addressing this issue, for example, could be feasible, at the curriculum level by expanding existing scientific writing classes in the introductory weeks into a course extending throughout the whole semester. At the module level, the

introduction of small writing assignments in subject-specific courses could from early semesters on be an attractive way for allowing students to meet standards in scientific writing. By this approach, deficits in gaining information from scientific literature and placing experimental findings from graduation projects into a scientific context could be reduced.

Regarding practical experiences throughout the studies, the auditors have the impression that the students would significantly take profit from converting voluntary internships (so-called summer trainings) into a mandatory part of the curriculum for preparing students in-depth for conducting scientific research. Since the beginning of the academic term 2016/2017, students of all three degree programmes have the option to gain practical experience in the course of an internship between spring and fall term of the last year of the programme. The summer training is usually carried out within a period of 6 weeks during summer time outside the regular teaching period.

The auditors are convinced that summer trainings provide a decisive added value in terms of practical experience to the students' qualification profile. Support for this assessment derives from conversations with employers and graduates. Companies offering internships are interested in hiring motivated and talented students after graduation. In the auditors' opinion, graduates who do not participate in the summer training lack the necessary practical experience to adequately qualify them for entering the labor market. The auditors, therefore, strongly recommend making summer trainings a mandatory part of the curriculum (see also Criterion 2.1).

Furthermore, the auditors note that the curricula of all degree programmes entail some courses that relate probably more indirectly to qualifying students in terms of international scientific standards. The auditors understand that the unique location of UQU in the city of Makkah justifies a specific profile with an emphasis on Quran and Islamic studies. In view of the fact that most, if not all, students originate from Arabic countries mandatory courses teaching Arabic language occupies, according to the peers' opinion, a considerable fraction of the three natural sciences curricula under review. The auditors expect students being admitted to the degree programmes at the College of Applied Science to have received sufficient expertise in speaking, reading, and writing Arabic on a well-educated level. Compensating deficits from high school education is not the duty of a university. An approach to securing that appropriate standards in Arabic language are met would be to request applicants to properly fill out questionnaires and pass an interview as part of an entrance examination.

Directing language issues to high school education provides an option for introducing electives in the three degree programmes under review. For example, classes in biochemistry, technical chemistry, toxicology and biophysics would, according to the auditors, be useful

for creating more opportunities for students to specialize and to make them even more attractive for the job market.

Criterion 1.4 Admission requirements

Evidence:

- Self-Assessment Report
- Webpage Umm Al-Qura: <https://uqu.edu.sa/en>

Preliminary assessment and analysis of the peers:

Admission requirements for all degree programmes are based on three elements: the final grade of the high school degree, passing of general IQ test by the applicant, and passing a test specifically designed for applicants considering enrolling for degree programmes at the College of Applied Science.

The results are combined and weighted against a minimum threshold percentage that is defined annually for each programme. Combined results above the minimum threshold grant access to the programme, results below threshold not.

As specified on the university's homepage the admission requirements at UQU are:

1. The student must be Saudi national, or descending from a Saudi mother (non-Saudis may apply for scholarship programmes).
2. The applicant must be holding secondary school certificate (or an equivalent) from the Kingdom or abroad.
3. The secondary-school certificate must be a recent one (not exceeding 5 years). For the Colleges of Medicine, Pharmacy and Health Sciences, the period must not be longer than 2 years.
4. The student must pass all exams (aptitude test + summative test + English language test) organized by the National Center for Academic Assessment, if required by the desired department.
5. The student pass any other exam or interview required by the college (recitations, judicial studies, physical education, art education, Sharia, etc.)
6. The applicant must not have been dismissed from the University or any other university for punitive purposes.

The auditors consider the chosen requirements suitable for ensuring subject-specific qualification of graduates from high school for being admitted to higher education at UQU.

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

The peers thank UQU for clarifying that the Field Training/Summer Training/Internship in all degree programmes under review is mandatory for all students. Assessment includes a written report and an oral presentation. This is stated in the Field Training course description. The students have the option to choose the field where they want to do the field training (clinical sector/environmental or public health sector/food, water, pharmaceutical industry sector in the Biology and Microbiology programme).

With respect to the Chemistry programme, the peers acknowledge receiving the requested additional documents, namely the complete module descriptions and the current study plan 37. This includes a description and guidelines for the graduation project. In addition, the module handbook is now available on the website of the Chemistry Department both in Arabic and in English.

The peers consider criterion 1 to be fulfilled.

2. The degree programme: structures, methods and implementation

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| Criterion 2.1 Structure and modules |
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Evidence:

- Self-Assessment Report
- Study plans of the degree programmes
- Module descriptions

Preliminary assessment and analysis of the peers:

The curricula of the degree programmes in Biology, Chemistry, and Microbiology are, according to the opinion of the auditors, logically structured and suited for achieving the majority of intended learning outcomes. Minor reservations to this general statement refer to the scientific background and depths of the Bachelor's thesis as outlined in the previous chapter (see Criterion 1.3).

Each curriculum is composed of modules (here named "courses") which the auditors perceive as comprehensive, and self-contained teaching and learning units. Apart from the graduation project and the internship ("summer training"), the auditors consider schedule,

content, and the expected work load as expressed in credit hours / credit points to be reasonable and adequate (see following chapter).

The optional internship ("summer training") for the Chemistry programme takes place between the sixth and the seventh semester and is credited with 3 points.⁴ The graduation project takes place in the eighth semester and is credited with 3 credit points.

In the Department of Biology the graduation project takes place in the seventh semester (Ba Biology) or respectively in the sixth semester (Ba Microbiology) and is credited with three credit points. The optional internship ("practical field training") is included in the curriculum overview⁵ and commonly takes place after the eighth semester, which means after the research project. The internship in microbiology is credited with 4 credit points. The auditors understand that one of the reasons for the internship taking place after the eighth semester is that the internship currently is an optional part of the programme. The auditors also understand that the internship may simplify access to the job market and will ideally lead directly to employing the trainee after finishing the internship. As mentioned before, the auditors strongly recommend for all programmes under review to consider internships as essential part of the programme for preparing graduates to conduct scientific work meeting international standards. Accordingly, internships should be changed from being voluntary to mandatory.

In general, the degree programmes under review are designed to be completed within four academic years. As the intake for study plan 37 started in fall semester 2016/2017, assessing the fraction of students able to complete the programme within the foreseen timeframe was only possible for the auditors by looking at statistical data referring to previous study plans (33 and 19). Data summarizing number of admitted students, drop-out numbers, and the number of graduations were, however, only accessible for the auditors for male students in the Biology programme. In order to be able to draw a conclusion, the audit team asks the Department of Chemistry and the Department of Biology to provide supplementary statistical data on student progression (number of intakes and graduates) and dropout rates referring to the current programme.

The audit team learns from the discussions during the audit that studying abroad so far is not an option considered by the programme coordinators. The auditors learn from the students and the graduates that a large number of graduate students consider applying for

⁴ Website of the Chemistry College, Study Plan version 37, retrieved 23.12.2017.

⁵ Website of the Biology College, Study Plan version 37, retrieved 23.12.2017.

scholarships for enrolling abroad to attend Master's programmes. In addition, several student express their interest in taking courses at other universities in the Kingdom of Saudi-Arabia or in other countries.

UQU offers Master's programmes in Chemistry and Biology. Applicants for the Master's degree programmes are being recruited predominantly from the associated Bachelor study programmes. In view of this background, participating in exchange programmes and considering international mobility already at undergraduate level as part of the curriculum, may, according to the auditors, be an attractive approach to secure international standards and to train highly qualified and skilled future scientists at an internationally cooperating UQU.

The audit team points out that the current theoretical option to study abroad at other higher education institutions - which currently depends on the individual effort of the student - should be systematically supported by the college and the university. Exchange agreements should be established with foreign universities and the possibility to study abroad should be actively promoted.

Criterion 2.2 Workload and credits

Evidence:

- Self-Assessment Report
- Study plans of the degree programmes
- Module descriptions

Preliminary assessment and analysis of the peers:

According to the Self-Assessment Report, one credit point corresponds to 30 hours of workload – including contact hours and independent study (Chemistry), or at least including contact hours and exam preparation (Biology, Microbiology). From discussions during the visit, the audit team gains the impression that the number of credit points awarded does not systematically correspond to the actual workload of the students.

The auditors perceive that the underlying credit hour system used for assigning credit points primarily reflects attendance times of students, without including working hours required for self-studies.

Accordingly, the actual workload exceeds the number of awarded credit points. When asked, students mention study times required for passing selected courses, especially the graduation project and the summer training, exceed the number of awarded credit points

by far. In order to balance workload and awarded credit points, the auditors suggest systematically analysing the workload for all courses. This is especially necessary in degree programmes whose curricula have been revised and further developed. Therefore, the auditors strongly recommend conducting on a regular basis a survey among students for more precisely determining the total workload per course and adjusting the crediting system in case discrepancies regarding allocated credits become obvious.

Regarding the importance of gaining necessary practical experience and thus labor market qualification, the auditors consider summer training as integral part of the curriculum. A mandatory summer training should be adequately described as such in the module handbook, and be appropriately credited in order to reflect the actual workload of the students. Similarly, the number of credit points awarded for the graduation project has to reflect the actual workload.

Criterion 2.3 Teaching methodology

Evidence:

- Self-Assessment Report
- Study plans of the degree programmes
- Module descriptions

Preliminary assessment and analysis of the peers:

The Bachelor's degree programmes in Biology, Chemistry, and Microbiology at UQU are full-time programmes with classroom and self-study activities. Class attendance is mandatory for all courses.

A range of didactical methods is applied in all degree programmes, to make sure that the students achieve the intended learning outcomes. Among the methods used are traditional lectures, classroom and laboratory exercises, assignments, project work, online learning, and seminars.

The auditors consider online learning groups between female and male students for working together on specific topics an attractive suitable approach for gaining experience in solving scientific problems as interacting group. Discussions between teachers and students are also carried out in WhatsApp-groups, allowing direct and real-time communication, also beyond regular lecture and university hours.

In general, the auditors see that the teaching methods employed are appropriate to support the attainment of the intended learning objectives.

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| Criterion 2.4 Support and assistance |
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Evidence:

- Self-Assessment Report

Preliminary assessment and analysis of the peers:

Students receive support in many study- but also personal-related situations at UQU. The auditors are impressed by the commitment of the officials in counselling students and helping to solve as many problems as possible. Resources and infrastructure for an effective support and assistance system are clearly visible and are being accepted by the students.

For guidance and assistance in planning their programme, students are assigned an academic advisor at the beginning of their studies. Involved in support and assistance are furthermore tutors, programme coordinators, teaching staff, as well as the members of the Careers and Employment Service. The teaching staff offers office hours for meeting students. The department's course coordinator and the Vice Dean for Academic Affairs have overall responsibility for student guidance, problem solving, and academic / non-academic counselling.

Both staff and students seem highly involved in the academic activities. Good relationships evidently exist between students and staff members. Reportedly, the teaching staff is highly responsive towards the students' needs and complaints as well. In order to develop ideas, raise questions and provide challenges students actively use the mentioned WhatsApp-groups. All students met by the auditors express a general and sometimes deep satisfaction with responsiveness of the teachers to their needs.

The auditors are deeply impressed by the dedication of the teaching staff for supporting and assisting students. This strong engagement is directly reflected by dedication, contentment, and respect of the students towards their teachers, as expressed in conversations the auditors have had during the audit.

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

The peers see that UQU has provided statistical data on enrolment, dropouts, and graduation for male students in the Biology and Microbiology programmes via the annual reports. The Chemistry Department has submitted this data together with its statement on the report.

As mentioned in the final assessment of the peers of criterion 1, the peers understand that the Field Training is a compulsory part of the curriculum and, therefore, there is no need for issuing a recommendation to this cause.

Although, the Chemistry Department ensures that the workload of the Research Project (2 credit hours) is sufficient for conducting the project, the peers still think that it is necessary to verify the time the students spend on the Research Project and to award the credits accordingly. For this reason, they expect UQU to provide conclusive documents in the course of the fulfilment of requirements.

Taking UQU's response into consideration, the peers judge criterion 2 to be mostly fulfilled.

3. Exams: System, concept and organisation

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| Criterion 3 Exams: System, concept and organisation |
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Evidence:

- Self-Assessment Report
- Module descriptions

Preliminary assessment and analysis of the peers:

As stated in the Self-Assessment Report, there is a period in every semester for midterm exams and a period for final exams. Student performance is not only evaluated based on the final examination. Assignments, laboratory work, homework, mid-term exam, and seminar work may contribute to the final grade of a course. Examinations are typically written exams, such as essays, problem-solving or case-based questions and calculation problems. The form of the exams for every module is specified in the associated module description. Examinations are scheduled according to the academic calendar. For repeating failed examinations, students must retake the course during the summer semester or within the regular course of the next academic term. The summer semester is an optional third term designed for students who have credit deficits or have failed exams.

The study progress of every student is monitored by the teaching staff based on attendance and preparedness for classes.

The auditors have the impression by studying the Self-Assessment Report and from discussions during the audit that the methods used by the teaching staff at the College of Applied

Science for assessing learning outcomes are appropriate. The examination methods include, depending on the subject and the intended learning outcomes, mid-term and final examinations, laboratory works, subject-specific assignments and projects. Some written examinations, however, leave the impression behind that students seem to succeed in learning by heart and are merely reproducing this knowledge. This approach, in combination with prevalence of written assessments, and the fact that almost none of the exams is oral, casts doubts whether the selection of methods adequately prepares students for future careers in research-oriented professions. In order to better meet international scientific standards and to ensure that the intended learning outcomes of the courses are met, the auditors strongly recommend implementing more competence-oriented examination methods, for example oral examinations and presentations.

Relevant rules for organizing and conducting examination, assessment criteria, procedures in case of re-sits, disability compensation measures, proceedings in case of illness and other mitigating circumstances are transparently put into legal regulations. Students and lecturers confirm in discussions that both sides are aware of the regulations, and the auditors have the impression that this system is operative with the aim to meet the requirements of the students as far as possible. In discussions, students describe the organization of examinations as transparent and responsive to their needs. This judgment explicitly includes the policy of retaking the course in the case of a failure.

During the audit the peers inspect sample exams and final theses (graduation projects). Not all theses shown to the auditors correspond to scientific standards, as would have been expected based on the project description. The auditors consider scientific working standards, ethics in science, and concepts of writing scientific publications essential for graduating from scientific study programmes. In case students work as a group for preparing a project thesis, the individual contribution of every student has to be apparent and clearly stated in the thesis in order to allow the individual contributions to be assessed. A reasonable limit for group size for conducting a graduation project are three students.

In order to meet international standards the auditors strongly recommend reconsidering scope, experimental background and documentation of the Bachelor's thesis (graduation project). Setting international standards will be the key for students to continue academic education, particularly abroad, and will support graduates in finding a science-related job in the private sector or at universities. Appropriate scope and academic quality of a Bachelor's thesis in Biology, Chemistry, and Microbiology have to be guaranteed in order to meet the learning outcome "ability to work scientifically" in every instance. A possible approach to achieving this goal, according to the auditors impression, could be a manual for defining standards in scope, quality of experimental or theoretical work for the graduation

project. Writing and presentation could follow suggestions made by, for example, the ACS-style guide.

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

The peers understand that the courses are not only evaluated by the final examination (which is usually a written exam), but other examination methods such as assignments, laboratory work, homework, mid-term exam, and seminar also contribute to the final grade. The details are mentioned in the module descriptions. Nevertheless, the peers are still convinced that it would be useful to better align the examination forms with the intended learning outcomes of the module and to conduct more oral examinations.

A final thesis is a compulsory part of the degree programmes and the peers have no doubt that all students are participating as required. However, they insist that the individual contribution, in case of a group work, must be apparent and that the scope and quality of the research project is comparable to international standards. UQU needs to submit conclusive documents verifying that the graduation project meets the intended scientific standards and make transparent the individual contribution of each student.

The peers consider criterion 3 to be partly fulfilled.

4. Resources

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| Criterion 4.1 Staff |
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Evidence:

- Self-Assessment Report
- Staff Handbook
- Annual Programme Report Biology 2016/17
- Annual Programme Report Chemistry 2016/17
- Annual Programme Report Microbiology 2016/17

Preliminary assessment and analysis of the peers:

At UQU, the staff members have different academic positions. There are full professors, associate professors, assistant professors, lecturers and demonstrators. The academic position of every staff member is based on research activities, publications, academic education, supervision of students, and other supporting activities. For example, a full professor

needs to hold a PhD degree. In addition, responsibilities and tasks of a staff member with respect to teaching load, research, and supervision depend on the academic position.

According to the Self-Assessment Report, the Department of Biology employs a total of 112 staff members (16 (3 female) professors, 12 (5 female) associate professors, 31 (23 female) assistant professors, 11 (11 female) lecturers, and 17 (17 female) demonstrators). 24 staff members of the Department of Biology pursue PhD-studies abroad, being supported by scholarships. The latter are not involved in teaching at UQU before having received a PhD. The academic personnel works in the disciplines of botany, zoology, and microbiology. The auditors were concerned for reasons of parity and continuity that most female staff members of the Department of Biology are assistant professors, lecturers or demonstrators, whereas most of the full professors and associate professors are male.

The majority of the staff members are from Saudi Arabia and hold permanent positions; employment contracts for the non-Saudi-Arabian teachers are limited to one year and need to be renewed annually. The auditors did not receive a complete staff handbook from the Department of Biology and therefore request UQU to provide the audit team with this important information for review.

The teaching staff of the Department of Chemistry subdivides in demonstrators (29), lecturers (20), assistant professors (29), associate professors (13) and full professors (16). The distribution between male and female staff members is not mentioned in the Self-Assessment Report, but during the visit, the auditors gain the impression that, similar to the situation in the Department of Biology, most professors and associate professors are male and most female staff members are demonstrators, lecturers, or assistant professors. Of the total 106 staff members, 19 are on one-year-contract positions with UQU. Staff members with limited contracts come from different international universities (e.g. Egypt, Sudan, and Syria). The auditors did receive a complete staff handbook from the Department of Chemistry as appendix to the Self-Assessment Report.

The auditors discuss with UQU's management about the university's policies and strategies for hiring new staff members. Accordingly, the Head of the College of Applied Science is asked to submit an annual strategic plan summarizing vacant positions and the need for hiring a specific expert in a field of research and teaching. The report takes the current situation and future planning into account. Vacancies and job specifications are announced on UQU's webpage. Applicants from the Kingdom of Saudi-Arabia are hired primarily, applicants from abroad hereafter.

During the audit, the auditors learn that most staff members in the Department of Biology as well as in the Department of Chemistry conduct research activities and involve their students in these activities. The College of Applied Science edits an annual book with copies

of the papers and articles published by the academic staff. The auditors are impressed by quality of published studies, the number of articles, and the fact that the College of Applied Science is the by far the most productive faculty in terms of scientific output at UQU. The peers are also deeply impressed by the extent of third party funding of the faculty, which exceeds research project funding by government institutions or industry in comparison to all other faculties at UQU.

For achieving the aim to reach international standards, the auditors consider the fact that most of the staff members have acquired their PhD abroad, e.g. in UK, Germany or Japan a valuable starting point. This approach could, according to the auditors' opinion, be a general approach for the College of Applied Science to send staff members abroad for post-graduate education, in order to develop upon return study programmes balancing national needs with international demands.

In order to use highly trained academic staff as good as possible for educating students, the auditors suggest supporting professors by trained and permanently available laboratory technicians (e.g. for preparing experimental parts of courses, setting up required instruments for analytical purposes, and maintaining this equipment). Teachers as well as students report in discussions during the audit that the teaching staff performs regular maintenance of laboratory equipment, if ability and available spare parts allow doing so. Maintaining the expensive indispensable equipment seems to be a general problem in the Departments of Biology and Chemistry at UQU. According to the teachers, repairs of laboratory instruments in case of a break down consumes significant time and is sometimes hampered by lacking technical expertise in maintenance and availability of spare parts. In order to solve issues like these, institutes in other countries commonly employ an adequate number of trained technicians. According to information provided by the professors, UQU employs few to none technicians for running instruments used for educational purposes. For this reason, the auditors strongly recommend developing an appropriate concept for assuring that an adequate number of technicians is available for maintaining and running technical instruments for educational purposes. An option for achieving this goal on short term is to send applicants or already employed technicians abroad for training them by companies selling sophisticated laboratory equipment.

Regarding teaching in general, the auditors are deeply impressed by the excellent and open-minded atmosphere among the students and the staff members existing in all divisions visited during the audit. This interaction creates an atmosphere of understanding and support and is one of the very strong aspects of the degree programmes in Biology, Chemistry, and Microbiology.

Scientific background, international visibility, and the number of personnel involved in teaching theory and practice – ranging from scientifically recognized professors to lecturers at the very start of their career – cast, according to the auditors, no doubt that degree programmes in Biology, Chemistry, and Microbiology at UQU will be successfully implemented, sustained, and developed for successfully handling future scientific and economic challenges.

Criterion 4.2 Staff development

Evidence:

- Self-Assessment Report
- Staff Handbook

Preliminary assessment and analysis of the peers:

According to the Self-Assessment Report, the aim of the College of Applied Science is to create a good working environment for its staff members, and to support their professional development and well-being at work. At UQU, the Vice Rector for Quality and Skills Development is responsible for these tasks. He annually revises the aims for professional development and expertise to be acquired, and decides on the focus areas of personnel training at UQU. In order to achieve these goals, UQU organises training workshops for staff members, which aim at strengthening the practical teaching competences and the didactic skills. In addition, UQU offers specialized courses for utilizing presentation-, documentation-, statistics- and e-learning-software. The teachers are also obliged to participate in management training programmes organized by the university or the faculty. Depending on the result of course evaluations, staff members at the lower end of the ranking take part in annual performance and development discussions with the Head of Department in charge. An integral part of such teaching performance reviews refers to goals for further developments in teaching skills and defines required individual training.

The auditors discuss with the members of the teaching staff opportunities for developing personal skills and learn that the teachers are satisfied with the internal qualification programme at UQU. During the audit, the teachers describe existing opportunities for attending and participating at international meetings and workshops in their field of expertise by either delivering lectures, or presenting research results on posters.

In addition, UQU has developed an academic incentive programme for teachers. Quality in teaching, as expressed, for example by course evaluations and awards, contribute to possible financial support by UQU. Other parameters supporting chances to receive funding from UQU are research performance, academic development, and involvement in tutoring

programmes. On a five-year schedule, professors may apply for a sabbatical leave, e.g. for joining international research programmes.

To sum up, the auditors regard options and support mechanisms provided by UQU for members of the teaching staff for further developing professional and teaching skills as adequate and sufficient.

Criterion 4.3 Funds and equipment

Evidence:

- Self-Assessment Report
- On-site visit of the laboratories, lecture rooms, and the library

Preliminary assessment and analysis of the peers:

As described in the Self-Assessment Report, the College of Applied Science has 25 classrooms, 200 computer workplaces in 9 laboratories, and seminar rooms for group work. On the College's premises, there is a restaurant and a cafe serving students and staff members. The campus also hosts a student health center.

Students can use computers provided by the university in a public section of the library or use their own laptops. The Information Services and Technology (IT) Unit is responsible for maintaining and replacing computers, updating software and data systems. Centralized services, such as learning environments are accessible for registered personal from outside the campus. The university library provides relevant databases for conducting scientific research and for educational purposes. Students have access to printed and electronic versions of books as well as contemporary scientific journals. Electronic books can be accessed via a link to the library electronic archive. The library is built and equipped for on-site and online retrieval of information and knowledge.

By inspecting the science books section, the auditors gain impressions of the scientific literature offered by the library for the students. The library is located in a modern spacious building offering plenty of desks and seats for students to work. Users have access to international literature, scientific journals, and publications. Most printed editions from science books are outdated, but are available in newer editions in the e-book archive, according to the librarian. The students also express in discussions satisfaction with the library and the available literature. From their point of view, the current international literature and the available databases entirely serve their purposes.

The auditors discuss with representatives of UQU's management funding issues and available financial resources for the College of Applied Science. The auditors learn that the government provides most funding for teaching and equipment. Further funding can be applied for at the King Abdulaziz City for Science and Technology (KACST), an independent scientific organisation that is the national science agency of Saudi-Arabia under the regime of the Saudi Arabian Prime Minister. KACST is primarily in charge of proposing, developing and implementing strategies for the advancement of science and technology concerning national and international affairs. Private companies provide additional financial funds.

The auditors understand that the governmental funding is closely linked to the number of students admitted to UQU and that the funding is secured for the next years. For distributing the available financial resources within UQU, every College has to submit an annual plan that lists needs and requirements of the division. The management of UQU ranks demands from colleges as outlined in the annual reports and decides how and where to allocate funding from the budget.

From inspecting laboratories and classrooms, the audit team gains the impression that infrastructure and technical equipment in most instances are adequate for education according to the aims outlined in degree programmes in Biology, Chemistry, and Microbiology. Basic technical equipment in the Departments of Biology and Chemistry seems to be available in sufficient quantity. Gradually modernizing the equipment is essential according to the reviewers, because graduates will face significantly newer equipment when engaged in companies for conducting internships or in future jobs. The students report during the discussion with the auditors that they consider the available equipment to be adequate and only materials, for instance chemicals, for conducting laboratory experiments are missing and that some of the technical equipment is outdated.

Light microscopes are available in the Department of Biology in adequate numbers, so in the course of the practical work students can analyse microscopic preparations individually and thoroughly. Dissecting microscopes, however, are apparently not available for every student. This would be necessary, because this allows observing specimens from the field or preserved specimens macroscopically with a higher magnification. Dissecting microscope are essential for understanding small structures, the exact location of sections for light microscopy, and to make thin sections for light microscopy. Students have to make their own sections for light microscopic observation. Otherwise, they will not be able to relate the structures observed with the light microscope to their structural and functional context of the complete organism.

All students learn in laboratory courses fundamental experimental techniques. To meet international standards in the Biology, Chemistry, and Microbiology programmes, the diversity of hands-on experimental and problem solving oriented laboratory work needs to be broadened. In order to reach international level, the auditors expect UQU to provide a concept, a reliable financial plan, and a timetable for upgrading the technical equipment in the laboratories and to initiate first steps for its implementation. The auditors also suggest employing an appropriate number of technicians for supporting the teachers in preparing and conducting practical courses.

In addition, the auditors notice some shortcomings at the herbarium and the botanical garden. The quality of the present botanical garden is not up to international standards. It needs a major improvement. The same is true for the zoological collection. It would benefit from modern preservation techniques (plastination) and up-to-date presentation. In particular, specimens demonstrating modern concepts of embryology and phylogeny (including evolution) should be included. The Biology Department should try to obtain additional funds for further improvement of herbarium and the botanical garden.

Educating students according to national standards implies that students learn currently valid safety regulations from institutional safety instructors and to adhere to these regulations while performing experiments. From inspecting laboratories in the Department of Chemistry, the auditors have the impression that some regulations are fulfilled, such as labelling of chemicals on benches and others not, such as safety directives written by the students before conducting an experiment. In addition, the auditors identify chemicals, which were, at least temporarily, seemingly not stored in aspirated safety cabinets. Accordingly, the auditors consider it essential that UQU states in detail underlying safety standards and regulations for working with hazardous substances (e.g. ISO). The safety concept should also define the role of safety instructors, for example in teaching students on a regular basis and particularly on the day of the experiment. The auditors furthermore consider the number of eye washers, first aid kits, and emergency safety showers as too few; in some chemical laboratories the auditors could not find eye washers, matching current hygiene standards, and emergency showers.

The auditors appreciate that UQU is currently building a central research laboratory that will be furnished with sophisticated and advanced technical equipment. A detailed concept for the different laboratories and their technical features already exists. The establishment

of the central research laboratory will help UQU and especially the College of Applied Science further increasing the research activities and to better involve the students in them.

In spite of deficits mentioned in the previous paragraphs, the auditors consider the available funds, technical equipment, and infrastructure (laboratories, library, seminar rooms etc.) adequate for implementing the degree programmes.

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

The peers consider criterion 4 to be mostly fulfilled.

5. Transparency and documentation

Criterion 5.1 Module descriptions

Evidence:

- Self-Assessment Report
- Module descriptions
- Webpage Umm Al-Qura: <https://uqu.edu.sa/en>

Preliminary assessment and analysis of the peers:

During the audit, the auditors received module descriptions from the Bachelor's degree programmes Biology and Microbiology. The descriptions for most but not all modules of the Bachelor's degree programme Chemistry were available as downloadable appendices to the Self-Assessment Report. Descriptions for courses in "Botany", "Zoology", "English Language", "Mathematics", "Islamic culture (1-4)", "Quran (1-4)", "General Physics 1", "Prophetic Biography", "Arabic Language", "Computer Science", "Polymer Chemistry", and the "Research Project" were not included in the module handbook and need to be delivered by UQU.

Students and stakeholders have access to the module descriptions via UQU's homepage.

After studying the module descriptions, the auditors notice that there is no information about the responsible person and awarded credit points. They also point out that the module descriptions do not always clarify, which type of assessment exactly is used, how long the exams take, and how the final grade is derived from the different assessing methods.

This information is only given in some few course descriptions but is missing otherwise. As a result, a thorough revision of the course descriptions is needed.

Some modules, according to the auditors concerns, need to be revised to meet international standards. Topics in the course „Plant Kingdom“ are generally organized according to the most recent systematic from bacteria via chromista, fungi to other life forms. A course on “Mycology and Plant Pathology” should cover biology of viruses, bacteria, and animals relevant for cultivated plants in order to put the biology of fungi into an appropriate scientific context. Otherwise, the title of the course is not adequate and it should rather be named “Mycology”. Contemporary education also requires to consistently using scientific names complying with international standards for naming organisms, for example *saprolegnia* instead of *sabreaulegnia*, *pythium* instead of *petheim* and so on.

The auditors pleased to see that most module descriptions contain bibliographical references. Most references are useful, some should be reconsidered, but almost all references refer to outdated issues of the textbooks. For example, the course on quantum chemistry recommends textbooks issues from 1970 (P.W. Atkins, Molecular quantum mechanics) and 1988 (M.W. Hanna, Quantum mechanics in Chemistry). The books are fine, no doubt, but are hardly able to cover newer developments in this rapidly growing field of research. The course “surface chemistry” names a two-volume handbook (Handbook of Applied Surface and Colloid Chemistry) as required textbook. Most topics covered in this course are summarised in tutorial low-priced textbook by Duncan Shaw (Introduction to Colloid and Surface Chemistry; Butterworth). Textbook recommendations for the course on natural product chemistry are two books specialized in heterocyclic chemistry and one textbook in organic chemistry by John Murphy; the latter, however, contains no chapter dealing with the secondary metabolites covered in the course.

Furthermore, the module handbooks of all degree programmes under review do not include module descriptions for the classes offered by other faculties (Quran Studies, Islamic Culture, Arabic Language, and English). Since the auditors need to have a complete picture of all classes offered they ask UQU to provide the missing module descriptions. The same refers to description of the Bachelor’s thesis (graduation project) for all degree programmes.

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| Criterion 5.2 Diploma and Diploma Supplement |
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Evidence:

- Self-Assessment Report
- Sample Transcript of Records for each degree programme

- Sample Diploma Certificate for each degree programme
- Sample Diploma for each degree programme

Preliminary assessment and analysis of the peers:

The auditors approve from studying the documents provided for review that the students of the degree programmes in Biology, Chemistry, and Microbiology are awarded a Diploma and a Diploma Supplement after graduation. The Diploma consists of a Diploma Certificate and a Transcript of Records.

The auditors point out that the Diploma Supplement should inform about the structure and content of the respective degree programme, provide information about the individual performance as well as statistical data regarding the final grade, and include information about the composition of the final grade according to the ECTS-Users' guide. This allows the reader to categorise the individual result. The currently issued Diploma Supplement is more similar to a Transcripts of Records and does not follow the internationally accepted standards for a Diploma Supplement.

In order to rate the level of academic education and qualification from a study programme, as common practice in countries UQU wishes to compete with, the auditors expect that all graduates of the degree programmes must be provided with a standardised Diploma Supplement. This way academic qualification is comparable and raises chances for succeeding on the job market or for applying for continuing studies abroad. The Diploma Supplement must include a description of the academic career, the competences acquired during the studies, explain the qualification gained including the achieved learning outcomes and the context, level, content and status of the studies that were pursued and successfully completed.

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| Criterion 5.3 Relevant rules |
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Evidence:

- Self-Assessment Report
- Webpage Umm Al-Qura: <https://uqu.edu.sa/en>

Preliminary assessment and analysis of the peers:

The auditors confirm that the rights and duties of both UQU and the students are clearly defined and binding. All rules and regulations are published on the university's website and hence available to all relevant stakeholders. In addition, the students receive all relevant course material in Arabic at the beginning of every semester.

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

The peers appreciate that UQU has submitted complete module descriptions for the Chemistry programme. The descriptions include the information about the responsible person and the awarded credit points. The bibliographical references were reviewed and updated. However, the mentioned deficits in the module descriptions of the Biology and Microbiology programmes remain.

The peers consider criterion 5 to be mostly fulfilled.

6. Quality management: quality assessment and development

Evidence:

- Self-Assessment Report
- University Development and Quality Unit in Umm Al-Qura University (Present and Future), 2016

Preliminary assessment and analysis of the peers:

The auditors discuss the quality management system at UQU with the programme coordinators and the students. The auditors learn that quality management at UQU is understood as a continuous process for improving quality of the degree programmes, being achieved through internal and external evaluation. Internal evaluation of the quality of the degree programmes is performed by surveys. A students' survey is organised by the university as organisational institution for evaluating didactical and professional performance of teachers. This evaluation takes place in every course and in every semester. The auditors receive the information in the course of the audit that the students are informed about evaluation results. In case of negative feedback, the Dean of the College of Applied Science talks to the respective teacher, analyses the problems, and offers solutions. The auditors gain the impression that the teaching staff take the students' feedback seriously and negative feedback has the potential to induce changes for enhancing quality of the degree programme.

Secondly, the College of Applied Science conducts a graduate survey with respect to the quality of the degree programmes. This type of feedback is designed to consider changes in the curriculum by the College of Applied Science for matching needs of graduates in terms of job perspectives and future plans.

Thirdly, and finally, employers are asked to give their feedback on qualification profile and employability of graduates from the College of Applied Science. For this purpose, employers are also invited to take part at annual workshops with the programme coordinators where the further development of the degree programmes and the requirements of the job market are discussed.

External quality assessment of the degree programmes is provided by the National Commission for Academic Accreditation & Assessment (NCAAA) in Saudi Arabia. The commission was established in 2004 with the responsibility for determining standards and procedures for accrediting higher education institutions and programmes within the Kingdom of Saudi Arabia. All degree programmes under review have been accredited by NCAAA, certifying that the resources and facilities provided, processes of teaching, support services, and quality and scope of students' education in terms of knowledge, skills and abilities needed for scientific practice meets required standards.

During the discussion with the programme coordinators, the auditors learn that a Student Council has been recently established. Rights and duties of the council remain somewhat unclear to the auditors. The students report to the auditors that the Student Council indeed exists and that this concept is rather new at UQU. In addition, the auditors receive the information that students are not represented in other boards of the College of Applied Science, especially not in the Curriculum Committee or the Faculty Council. The auditors point out that it is important to develop a culture of cooperation in which all stakeholders are involved in the processes of assessing, developing and improving the quality of study programmes. Therefore, they recommend including students' representatives in all important boards and panels of UQU.

The auditors learn from the representatives of UQU's partners from public institutions and private companies that stakeholder are regularly invited to workshops on the faculty level. On these occasions, the needs and requirements of the employers and possible changes to the degree programmes are discussed. In addition, some of the employers participate at the annual job fair and announce job vacancies to UQU so that the students can apply for the open positions. As the auditors consider the input of the employers to be very important for the further improvement of the degree programmes they appreciate the existing culture of quality assurance by involving employers in the process.

The auditors, in summary, consider the quality management system at the College of Applied Science operative and suitable for identifying weaknesses and inappropriate trends, implementing modifications for improving and strengthening the degree programmes. All stakeholders are involved in the process.

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

The peers consider criterion 6 to be fulfilled.

D Additional Documents

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

- Module descriptions of all classes taught in the degree programmes in English
- Complete Staff Handbook from the Department of Biology in English
- Current study plan for the chemistry programme, completely in English
- Statistics on drop-out rates / progression rates and employment rates of the Chemistry degree programme

E Comment of the Higher Education Institution (23.02.2018)

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

- Module descriptions of all classes taught in the degree programmes in English
- Complete Staff Handbook from the Department of Biology in English
- Current study plan for the chemistry programme, completely in English
- Statistics on drop-out rates / progression rates and employment rates of the Chemistry degree programme

F Summary: Peer recommendations (06.03.2018)

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

| Degree Programme | ASIIN-seal | Subject-specific label | Maximum duration of accreditation |
|------------------|--------------------------------|------------------------|-----------------------------------|
| Ba Biology | With requirements for one year | - | 30.09.2023 |
| Ba Chemistry | With requirements for one year | - | 30.09.2023 |
| Ba Microbiology | With requirements for one year | - | 30.09.2023 |

Requirements

For all degree programmes

- A 1. (ASIIN 2.2) Make sure that the actual workload of the students is consistent with the awarded credits.
- A 2. (ASIIN 3) Make sure that all students know how scientific publications are written and how scientific work is carried out.
- A 3. (ASIIN 3) Ensure that the graduation project meets the intended scientific standards and make transparent the individual contribution of each student.
- A 4. (ASIIN 4.3) Provide a concept, a reliable financial plan, and a timetable for upgrading the technical equipment in the laboratories and initiate first steps for its implementation.
- A 5. (ASIIN 5.2) Ensure that the Diploma Supplement contains detailed information about the educational objectives, intended learning outcomes, the structure and the academic level of the degree programme as well as about the individual performance of the student.

For the Bachelor's degree programme Chemistry

- A 6. (ASIIN 4.3) Upgrade the safety provision of the laboratories according to ISO quality standards.

For the Bachelor's degree programmes Biology and Microbiology

- A 7. (ASIIN 5.1) Rewrite the module descriptions so as to include detailed information about the responsible persons, the current content of the course, the exact form and length of the exams and the calculation of the final grade.

Recommendations

For all degree programmes

- E 1. (ASIIN 1.3) It is recommended to further improve the English proficiency of the students.
- E 2. (ASIIN 1.3) It is recommended to introduce electives and to reduce the number of non-subject-specific classes.
- E 3. (ASIIN 2.1) It is recommended to promote the academic mobility of the students.
- E 4. (ASIIN 3) It is recommended to stronger align the form of examination with the intended learning outcomes of the respective module.
- E 5. (ASIIN 4.1) It is recommended employing and training more laboratory assistants.
- E 6. (ASIIN 6) It is recommended to include students' representatives in the boards and panels of UQU.

For the Bachelor's degree programmes Biology and Microbiology

- E 7. (ASIIN 5.1) It is recommended to update the bibliographical references in the module descriptions.

For the Bachelor's degree programme Biology

- E 8. (ASIIN 1.1) It is recommended to revise the wording of the programme learning outcomes to make them more detailed and programme-specific.
- E 9. (ASIIN 4.2) It is strongly recommended to expand and update the herbarium and the botanical garden.

G Comment of the Technical Committees (16.03.2018)

Technical Committee 09- Chemistry (07.03.2018)

Assessment and analysis for the award of the ASIIN seal:

The Technical Committee discusses the procedure at the Umm Al-Qura University, in particular about the specific situation in Mecca (female campus accessible only to Muslims, long journey from Jeddah, many non-specific courses on Islam in the curriculum, flood of pilgrims during the Hadj). The Technical Committee agrees with the assessments of the auditors and unanimously endorses the proposed requirements and recommendations.

The Technical Committee 09 – Chemistry recommends the award of the seals as follows:

| Degree Programme | ASIIN seal | Subject-specific labels | Maximum duration of accreditation |
|-------------------------|--------------------------------|--------------------------------|--|
| Ba Biology | With requirements for one year | - | 30.09.2023 |
| Ba Chemistry | With requirements for one year | - | 30.09.2023 |
| Ba Microbiology | With requirements for one year | - | 30.09.2023 |

Technical Committee 10- Life Sciences (16.03.2018)

Assessment and analysis for the award of the ASIIN seal:

The Technical Committee discusses the procedure at the Umm Al-Qura University, in particular about the specific situation in Mecca (female campus accessible only to Muslims, long journey from Jeddah, many non-specific courses on Islam in the curriculum, flood of pilgrims during the Hadj). The Technical Committee agrees with the assessments of the auditors and unanimously endorses the proposed requirements and recommendations.

The Technical Committee 10 – Life Sciences recommends the award of the seals as follows:

| Degree Programme | ASIIN seal | Subject-specific labels | Maximum duration of accreditation |
|-------------------------|--------------------------------|--------------------------------|--|
| Ba Biology | With requirements for one year | - | 30.09.2023 |
| Ba Chemistry | With requirements for one year | - | 30.09.2023 |
| Ba Microbiology | With requirements for one year | - | 30.09.2023 |

H Decision of the Accreditation Commission (23.03.2018)

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

The ASIIN Accreditation Commission for Degree Programmes decides to slightly change the wording of requirements A 2. The Accreditation Commission otherwise follows the suggestions of the auditors and the involved Technical Committees.

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

| Degree Programme | ASIIN seal | Subject-specific labels | Maximum duration of accreditation |
|-------------------------|--------------------------------|--------------------------------|--|
| Ba Biology | With requirements for one year | - | 30.09.2023 |
| Ba Chemistry | With requirements for one year | - | 30.09.2023 |
| Ba Microbiology | With requirements for one year | - | 30.09.2023 |

Requirements

For all degree programmes

- A 1. (ASIIN 2.2) Make sure that the actual workload of the students is consistent with the awarded credits.
- A 2. (ASIIN 3) Make sure that all students know how scientific publications are written and how scientific work is conducted.
- A 3. (ASIIN 3) Ensure that the graduation project meets the intended scientific standards and make transparent the individual contribution of each student.
- A 4. (ASIIN 4.3) Provide a concept, a reliable financial plan, and a timetable for upgrading the technical equipment in the laboratories and initiate first steps for its implementation.

- A 5. (ASIIN 5.2) Ensure that the Diploma Supplement contains detailed information about the educational objectives, intended learning outcomes, the structure and the academic level of the degree programme as well as about the individual performance of the student.

For the Bachelor's degree programme Chemistry

- A 6. (ASIIN 4.3) Upgrade the safety provision of the laboratories according to ISO quality standards.

For the Bachelor's degree programmes Biology and Microbiology

- A 7. (ASIIN 5.1) Rewrite the module descriptions so as to include detailed information about the responsible persons, the current content of the course, the exact form and length of the exams and the calculation of the final grade.

Recommendations

For all degree programmes

- E 1. (ASIIN 1.3) It is recommended to further improve the English proficiency of the students.
- E 2. (ASIIN 1.3) It is recommended to introduce electives and to reduce the number of non-subject-specific classes.
- E 3. (ASIIN 2.1) It is recommended to promote the academic mobility of the students.
- E 4. (ASIIN 3) It is recommended to stronger align the form of examination with the intended learning outcomes of the respective module.
- E 5. (ASIIN 4.1) It is recommended employing and training more laboratory assistants.
- E 6. (ASIIN 6) It is recommended to include students' representatives in the boards and panels of UQU.

For the Bachelor's degree programmes Biology and Microbiology

- E 7. (ASIIN 5.1) It is recommended to update the bibliographical references in the module descriptions.

For the Bachelor's degree programme Biology

- E 8. (ASIIN 1.1) It is recommended to revise the wording of the programme learning outcomes in a more detailed and programme-specific way.
- E 9. (ASIIN 4.2) It is strongly recommended to expand and update the herbarium and the botanical garden.

I Fulfilment of Requirements (07.12.2018)

Comments of the peers and the Technical Committees (23.11.2018)

Requirements

For all degree programmes

- A 1. (ASIIN 2.2) Make sure that the actual workload of the students is consistent with the awarded credits.

| Initial Treatment | |
|-------------------|--|
| Peers | not fulfilled Vote: unanimous Justification: According to current versions of module handbooks, graduation projects in Biology are credited by 5 credit hours and in Microbiology and Chemistry by 3 credit hours. This value does not reflect the total workload. In general, the awarded credit hours only take the contact hours into account and the self-study time is not made transparent in the course specifications. There still is a misunderstanding in the way UQU should convert the actual time spent on average for a course into credit points. |
| TC 09 | not fulfilled Vote: unanimous Justification: The TC follows the judgement of the peers |
| TC 10 | not fulfilled Vote: unanimous Justification: The TC follows the judgement of the peers |

- A 2. (ASIIN 3) Make sure that all students know how scientific publications are written and how scientific work is conducted.

| Initial Treatment | |
|-------------------|---|
| Peers | fulfilled Vote: unanimous Justification: The module descriptions for graduation projects in all three degree programmes are very fine. Lectures and tutorials |

| | |
|-------|--|
| | accompanying the final year project give detailed information and support for conducting and writing up the final year thesis. |
| TC 09 | fulfilled Vote: unanimous Justification: The TC follows the judgement of the peers |
| TC 10 | fulfilled Vote: unanimous Justification: The TC follows the judgement of the peers |

- A 3. (ASIIN 3) Ensure that the graduation project meets the intended scientific standards and make transparent the individual contribution of each student.

| Initial Treatment | |
|-------------------|---|
| Peers | fulfilled Vote: unanimous Justification: On the assumption that the copies provided by UQU reflect the current average standard for graduation theses in the study programmes, international standards are clearly met and the individual contribution of each students is transparent. |
| TC 09 | fulfilled Vote: unanimous Justification: The TC follows the judgement of the peers |
| TC 10 | fulfilled Vote: unanimous Justification: The TC follows the judgement of the peers |

- A 4. (ASIIN 4.3) Provide a concept, a reliable financial plan, and a timetable for upgrading the technical equipment in the laboratories and initiate first steps for its implementation.

| Initial Treatment | |
|-------------------|--|
| Peers | fulfilled Vote: unanimous Justification: The list provided by UQU shows that first steps toward upgrading laboratory equipment have been performed. The explanation leaves in opinion no doubt that UQU will continue accordingly. |
| TC 09 | fulfilled Vote: unanimous Justification: The TC follows the judgement of the peers |
| TC 10 | fulfilled Vote: unanimous |

| | |
|--|--|
| | Justification: The TC follows the judgement of the peers |
|--|--|

- A 5. (ASIIN 5.2) Ensure that the Diploma Supplement contains detailed information about the educational objectives, intended learning outcomes, the structure and the academic level of the degree programme as well as about the individual performance of the student.

| Initial Treatment | |
|-------------------|--|
| Peers | not fulfilled Vote: unanimous Justification: The submitted Diploma Supplements lack in structure and academic level of the degree programmes as well as in a summary of the individual performance of the student. |
| TC 09 | not fulfilled Vote: unanimous Justification: The TC follows the judgement of the peers |
| TC 10 | not fulfilled Vote: unanimous Justification: The TC follows the judgement of the peers |

For the Bachelor's degree programme Chemistry

- A 6. (ASIIN 4.3) Upgrade the safety provision of the laboratories according to ISO quality standards.

| Initial Treatment | |
|-------------------|---|
| Peers | fulfilled Vote: unanimous Justification: UQU provided a detailed list for checking on a continual basis safety regulations according to internationally valid standards. The university is strongly encouraged to improve regulations, for instance, by checking fume hoods annually. |
| TC 09 | fulfilled Vote: unanimous Justification: The TC follows the judgement of the peers |
| TC 10 | fulfilled Vote: unanimous Justification: The TC follows the judgement of the peers |

For the Bachelor's degree programmes Biology and Microbiology

- A 7. (ASIIN 5.1) Rewrite the module descriptions so as to include detailed information about the responsible persons, the current content of the course, the exact form and length of the exams and the calculation of the final grade.

| Initial Treatment | |
|-------------------|--|
| Peers | fulfilled Vote: unanimous Justification: UQU provided copies of current module descriptions being in line with required standards. |
| TC 09 | fulfilled Vote: unanimous Justification: The TC follows the judgement of the peers |
| TC 10 | fulfilled Vote: unanimous Justification: The TC follows the judgement of the peers |

Decision of the Accreditation Commission (07.12.2018)

| Degree programme | ASIIN-label | Subject-specific label | Accreditation until max. |
|------------------|---------------------------------|------------------------|--------------------------|
| Ba Biology | Requirements 1, 5 not fulfilled | - | Six months prolongation |
| Ba Chemistry | Requirements 1, 5 not fulfilled | - | Six months prolongation |
| Ba Microbiology | Requirements 1, 5 not fulfilled | - | Six months prolongation |

The Accreditation Commission justifies its decision as follows:

The Accreditation Commission follows the judgement of the peers and the involved Technical Committees and considers requirements 1, 5, 6 to be not fulfilled.

A1: UQU must make sure that the actual workload of the students is consistent with the awarded credits. For example, the credits awarded for the graduation projects does not reflect the students' total workload. In general, the awarded credit hours only take the contact hours into account and the self-study time is not made transparent in the course specifications.

A5: The submitted Diploma Supplements lack in structure and content. The academic level of the degree programmes as well as the individual performance of the student are not described adequately.

K Fulfilment of Requirements (28.06.2019)

Comments of the peers and the Technical Committees (13.06.2019)

Requirements

For all degree programmes

- A 8. (ASIN 2.2) Make sure that the actual workload of the students is consistent with the awarded credits.

| Initial Treatment | |
|---------------------|--|
| Peers | not fulfilled Vote: unanimous Justification: According to current versions of module handbooks, graduation projects in Biology are credited by 5 credit hours and in Microbiology and Chemistry by 3 credit hours. This value does not reflect the total workload. In general, the awarded credit hours only take the contact hours into account and the self-study time is not made transparent in the course specifications. There still is a misunderstanding in the way UQU should convert the actual time spent on average for a course into credit points. |
| TC 09 | not fulfilled Vote: unanimous Justification: The TC follows the judgement of the peers |
| TC 10 | not fulfilled Vote: unanimous Justification: The TC follows the judgement of the peers |
| AC | not fulfilled Vote: unanimous Justification: UQU must make sure that the actual workload of the students is consistent with the awarded credits. For example, the credits awarded for the graduation projects does not reflect the students' total workload. In general, the awarded credit hours only take the contact hours into account and the self-study time is not made transparent in the course specifications. |
| Secondary Treatment | |
| Peers | partly fulfilled Vote: unanimous |

| | |
|-------|---|
| | <p>Justification: The module handbook has been modified so that for each module an additional table has been inserted which specifies the number of estimated working hours, broken down according to contact time and self-study hours. However, the current workload provided in the module descriptions for Research/Graduation Projects, does not seem to consider sufficient practical work for a four week project. In addition, the workload differs between the three programmes and is lowest for the Microbiology programme (124 h, 4 ECTS).</p> |
| TC 09 | <p>fulfilled Vote: per majority Justification: The Technical Committee sees that substantial improvements have been made, however some deficits with respect to the graduation project and its workload remain. For this reason, the TC considers the requirement to be fulfilled but suggests adding a comment in the notification letter. They emphasize that UQU needs to develop uniform scientific standards for the scope and quality of the graduation project and needs to make sure that the projects meet international standards for Bachelor's theses.</p> |
| TC 10 | <p>fulfilled Vote: per unanimous Justification: The Technical Committee sees that substantial improvements have been made, however some deficits with respect to the graduation project and its workload remain. For this reason, the TC considers the requirement to be fulfilled but suggests adding a comment in the notification letter. They emphasize that UQU needs to develop uniform scientific standards for the scope and quality of the graduation project and needs to make sure that the projects meet international standards for Bachelor's theses.</p> |

- A 5. (ASIIN 5.2) Ensure that the Diploma Supplement contains detailed information about the educational objectives, intended learning outcomes, the structure and the academic level of the degree programme as well as about the individual performance of the student.

| Initial Treatment | |
|-------------------|--|
| Peers | <p>not fulfilled Vote: unanimous</p> |

| | |
|----------------------------|---|
| | Justification: The submitted Diploma Supplements lack in structure and academic level of the degree programmes as well as in a summary of the individual performance of the student. |
| TC 09 | not fulfilled Vote: unanimous Justification: The TC follows the judgement of the peers |
| TC 10 | not fulfilled Vote: unanimous Justification: The TC follows the judgement of the peers |
| AC | not fulfilled Vote: unanimous Justification: The submitted Diploma Supplements lack in structure and content. The academic level of the degree programmes as well as the individual performance of the student are not described adequately |
| Secondary Treatment | |
| Peers | fulfilled Vote: unanimous Justification: The Diploma supplement has been updated and now includes all necessary information. |
| TC 09 | fulfilled Vote: unanimous Justification: The Technical Committee follows the auditors' assessment. |
| TC 10 | fulfilled Vote: unanimous Justification: The Technical Committee follows the auditors' assessment. |

Decision of the Accreditation Commission (28.06.2019)

| Degree programme | ASIIN-label | Subject-specific label | Accreditation until max. |
|------------------|-----------------------------|------------------------|--------------------------|
| Ba Biology | All requirements fulfilled* | - | 30.09.2023 |
| Ba Chemistry | All requirements fulfilled* | - | 30.09.2023 |
| Ba Microbiology | All requirements fulfilled* | - | 30.09.2023 |

* The Accreditation Committee for Degree Programmes decides to include the following reference into the notifying letter to the HEI:

“UQU should develop uniform scientific standards for the scope and quality of the graduation project and make them available to both teachers and students, with the goal to establish graduation projects that are aligned with international standards for Bachelor’s theses.”

Appendix: Programme Learning Outcomes and Curricula

According to the Self-Assessment Report the following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved by the Bachelor's degree programme Biology:

| Program Learning Outcomes | |
|---|---|
| Knowledge | 1- To know the ethics of biology and related areas of science. 2- To design methods for analyzing and solving problems in the field of biology and its applications. 3- To think critically in evaluating biological information. 4- To implement projects related to his study in biology program. |
| Cognitive Skills | 1- To understand the importance of scientific research and look at the recent advances in biological sciences. 2- To prepare, explore, identify, analyze and evaluate various scientific problems and solutions. 3- To compare and contrast the methods of scientific research and the ability to design and evaluation of scientific research. |
| Interpersonal Skills & Responsibility | 1- To involve working independently and with multi-disciplinary teams. 2- To cooperate in providing scientific and technical services in various fields for all sectors. 3- Bear responsibility in various situations. |
| Communication, Information Technology, Numerical | 1- To use the computer to prepare written reports, evaluate scientific data and calculations. 2- To use the internet to conduct search for published articles and books. |
| Psycho-motor | 1- To perform basic and advanced biological laboratory techniques. 2- To be able to operate laboratory instruments. |

The following curriculum is presented:

| FIRST YEAR | | | |
|----------------------|-------------------------------|----------------|--------------|
| LEVEL 1 | | | |
| Course No. | Course Name | Credits | Preq. |
| 4021101 | GENERAL CHEMISTRY | 4 | - |
| 601101 | ISLAMIC CULTURE 1 | 2 | - |
| 7001401 | ENGLISH LANGUAGE | 4 | - |
| 4041101 | MATHEMATICS (CALCULUS) | 4 | - |
| 605101 | HOLY QURAN 1 | 2 | - |
| Total credits | | 16 | |

| LEVEL 2 | | | |
|----------------------|--|----------------|--------------|
| Course No. | Course Name | Credits | Preq. |
| 4011101 | GENERAL BIOLOGY | 4 | |
| 7001401 | ENGLISH FOR APPLIED SCIENCE | 4 | 7001401 |
| 4031101 | GENERAL PHYSICS | 4 | |
| 501101 | ARABIC LANGUAGE | 2 | |
| 102101 | BIOGRAPHY OF THE PROPHIT MOHAMMAD | 2 | - |
| Total credits | | 16 | |

| SECOND YEAR | | | |
|----------------------|--------------------------|----------------|--------------|
| LEVEL 3 | | | |
| Course No | Course Name | Credits | Preq. |
| 4022061 | BIOSTATISTICS | 2 | |
| 4012211 | PLANT KINGDOM | 3 | 4011101 |
| 4022301 | ORGANIC CHEMISTRY | 4 | 4021101 |
| 4012041 | GENERAL ANATOMY | 3 | 4011101 |
| 605201 | HOLY QURAN II | 2 | 605101 |
| 6012311 | INVERTEBRATES | 3 | 4011101 |
| Total credits | | 17 | |

| LEVEL 4 | | | |
|----------------------|---------------------------|----------------|--------------|
| Course No | Course Name | Credits | Preq. |
| 4012232 | PLANT TAXONOMY | 3 | 4012211 |
| 4012242 | PLANT ECOLOGY | 3 | 4012211 |
| 4012322 | VERTEBRATES | 3 | 4912311 |
| 4012252 | PHYCOLOGY | 3 | 4011101 |
| 4012072 | BIOCHEMISTRY | 3 | 4022301 |
| 601201 | ISLAMIC CULTURE II | 2 | 601101 |
| Total credits | | 17 | |

| THIRD YEAR | | | |
|----------------------|-----------------------|----------------|--------------|
| LEVEL 5 | | | |
| Course No | Course Name | Credits | Preq. |
| 4013331 | ANIMAL PHYSIOLOGY I | 3 | 4012171 |
| 4013261 | PLANT PHYSIOLOGY I | 3 | 4012171 |
| 4013281 | GENETICS | 3 | 4011101 |
| 4013291 | FLORA OF SAUDI ARABIA | 3 | 4012232 |
| 601301 | ISLAMIC CULTURE III | 3 | 601201 |
| 605301 | HOLY QURAN III | 2 | 605201 |
| Total credits | | 17 | |

| LEVEL 6 | | | |
|----------------------|---------------------------|----------------|--------------|
| Course No | Course Name | Credits | Preq. |
| 4013352 | ANIMAL ECOLOGY | 3 | 4012322 |
| 4013362 | ENTOMOLOGY | 3 | 4012311 |
| 4013342 | ANIMAL PHYSIOLOGY II | 3 | 4013331 |
| 4013272 | PLANT PHYSIOLOGY II | 3 | 4013261 |
| 4013402 | VIROLOGY AND BACTERIOLOGY | 3 | 4011101 |
| 4013082 | MOLECULAR BIOLOGY | 3 | 4013281 |
| Total credits | | 18 | |

| FOURTH YEAR | | | |
|----------------------|------------------------------|----------------|--------------|
| LEVEL 7 | | | |
| Course No | Course Name | Credits | Preq. |
| 4014311 | PARASITOLOGY | 3 | 4012311 |
| 4014321 | FAUNA OF SAUDI ARABIA | 3 | 4013352 |
| 4014331 | PEST CONTROL | 3 | 4013362 |
| 4014411 | MYCOLOGY AND PLANT PATHOLOGY | 2 | 4011101 |
| 4014091 | ENVIRONMENTAL POLLUTION | 2 | 4013352 |
| 605401 | HOLY QURAN IV | 2 | 605301 |
| Total credits | | 15 | |

| LEVEL 8 | | | |
|----------------------|--------------------|----------------|--------------|
| Course No | Course Name | Credits | Preq. |
| 4014342 | ANIMAL BEHAVIOR | 2 | 4014321 |
| 4014352 | EMBRYOLOGY | 3 | 4012322 |
| 4014212 | TISSUE CULTURE | 3 | 4013281 |
| 4014112 | BIOTECHNOLOGY | 3 | 4013182 |
| 4014362 | ENDOCRINOLOGY | 3 | 4013342 |
| 601401 | ISLAMIC CULTURE IV | 2 | 601301 |
| Total credits | | 16 | |

| FOURTH YEAR | | | |
|--------------------|--------------------|----------------|--------------|
| SUMMER | | | |
| Course No | Course Name | Credits | Preq. |
| 4014923 | FINAL YEAR PROJECT | 5 | |

According to the Self-Assessment Report the following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved by the Bachelor's degree programme Chemistry:

1.2 Learning outcomes of the program

1.2.1 Knowledge (specialist competences)

Bachelor's degrees programs ensure that students:

- Are fully conversant with major aspects of chemical terminology.
- Demonstrate a systematic understanding of fundamental physicochemical principles with the ability to apply that knowledge to the solution of theoretical and practical problems.
- Gain knowledge of a range of inorganic and organic materials.
- Demonstrate, with supporting evidence, their understanding of synthesis, including related isolation, purification and characterization techniques.
- Demonstrate an understanding of the qualitative and quantitative aspects of chemical metrology.
- Develop an awareness of issues within chemistry that overlap with other related subjects.
- Develop knowledge and understanding of ethics, societal responsibilities, environmental impact and sustainability.

1.2.2 Cognitive skills

Cognitive skills to be developed and level of performance expected, Bachelor's degrees programs ensure that students:

- Demonstrate the knowledge and understanding of essential facts, concepts, principles and theories relating to the subject areas covered in their program
- Apply the knowledge and understanding given to the solution of qualitative and quantitative problems that are mostly of a familiar nature
- Recognize and analyze problems and plan strategies for their solution
- Generate, evaluate, interpret and synthesis of chemical information and data
- Use computational methodology and models skills based on practical applications of theories.

Chemistry-related practical skills

- Skills in the safe handling of chemical materials, taking into account their physical and chemical properties including any specific hazards associated with their use and the ability to conduct risk assessments
- Skills in the operation of standard chemical instrumentation
- Ability to interpret and explain the limits of accuracy of their own experimental data in terms of significance and underlying theory.

1.2.3 Interpersonal skills and responsibility

- Skills in the employment of common conventions and standards in scientific writing, data presentation, and referencing literature
- Problem-solving skills, relating to qualitative and quantitative information
- Basic interpersonal skills, relating to the ability to interact with other people and to engage in team working.

1.2.4 Communication, information technology and numerical skills

- Communication skills, covering both written and oral communication with a variety of audiences for the scientific material and arguments
- Demonstrate communication written or presenting skills.
- Demonstrate skills in the usage of computer, network, and software packages relevant to chemistry; e.g. Chem-draw, Microsoft excel.
- Numeracy and mathematical skills, including handling data, algebra, functions, trigonometry, calculus, vectors and complex numbers, alongside error analysis, order-of-magnitude estimations, systematic use of scientific units and different types of data presentation.

The following **curriculum** is presented:

| FIRST YEAR | | | |
|----------------------|---------------------|----------------|--------------|
| LEVEL 1 | | | |
| Course No. | Course Name | Credits | Preq. |
| 402101 | GENERAL CHEMISTRY 1 | 5 | - |
| 601101 | ISLAMIC CULTURE 1 | 2 | - |
| 401101 | BOTANY | 2 | - |
| 401102 | ZOOLOGY | 2 | - |
| 705101 | ENGLISH LANGUAGE | 2 | - |
| 404101 | MATHEMATICS | 4 | - |
| 605101 | QURAN 1 | 2 | - |
| Total credits | | 19 | |

| LEVEL 2 | | | |
|----------------------|----------------------------------|----------------|-------------|
| Course No. | Course Name | Credits | Preq |
| 402112 | VOLUMETRIC ANALYTICAL CHEMISTRY | 3 | 402101 |
| 705102 | ENGLISH LANGUAGE | 3 | 705101 |
| 402121 | GENERAL CHEMISTRY 2 | 2 | 402101 |
| 402131 | ALIPHATIC ORGANIC CHEMISTRY | 4 | 402101 |
| 403101 | GENERAL PHYSICS 1 | 4 | - |
| 102101 | PROPHETIC BIOGRAPHY | 2 | - |
| 402113 | QUALITATIVE ANALYTICAL CHEMISTRY | 2 | 402101 |
| Total credits | | 20 | |

| SECOND YEAR | | | |
|----------------------|----------------------------------|---------|--------|
| LEVEL 3 | | | |
| Course No | Course Name | Credits | Preq |
| 402213 | GRAVIMETRIC ANALYTICAL CHEMISTRY | 2 | 402112 |
| 402221 | CHEMISTRY OF MAIN GROUP ELEMENTS | 2 | 402121 |
| 402234 | AROMATIC ORGANIC CHEMISTRY | 3 | 402131 |
| 402243 | COLLOID CHEMISTRY AND PHASE RULE | 2 | 402121 |
| 402235 | QUANTUM CHEMISTRY | 2 | 402121 |
| 402241 | THERMODYNAMICS | 3 | 402112 |
| 405123 | COMPUTER SCIENCE | 3 | 404101 |
| 501101 | ARABIC LANGUAGE | 2 | |
| Total credits | | 19 | |

| LEVEL 4 | | | |
|----------------------|---------------------------------|---------|--------|
| Course No | Course Name | Credits | Preq |
| 402214 | ORGANIC ANALYTICAL CHEMISTRY | 2 | 402112 |
| 402223 | CHEMISTRY OF TRANSITION METALS | 3 | 402221 |
| 605201 | QURAN 2 | 2 | 605101 |
| 402235 | PHYSICAL ORGANIC CHEMISTRY | 3 | 402234 |
| 402242 | KINETIC CHEMISTRY AND CATALYSIS | 3 | 402241 |
| 402245 | ELECTROCHEMISTRY | 3 | 402112 |
| 402254 | INTRODUCTION TO SPECTROSCOPY | 2 | 402253 |
| 601201 | ISLAMIC CULTURE 2 | 2 | 601101 |
| Total credits | | 20 | |

| THIRD YEAR | | | |
|----------------------|---|---------|--------|
| LEVEL 5 | | | |
| Course No | Course Name | Credits | Preq |
| 402311 | SPECTROPHOTOMETRIC AND ELECTROCHEMICAL TECHNIQUES | 3 | 402112 |
| 402332 | ORGANIC SPECTROSCOPY | 3 | 402235 |
| 402333 | CHEMISTRY OF HETEROCYCLIC COMPOUNDS | 3 | 402234 |
| 402343 | SURFACE CHEMISTRY | 3 | 402243 |
| 601301 | ISLAMIC CLUTURE 3 | 3 | 601201 |
| 605301 | QURAN 3 | 2 | 605201 |
| Total credits | | 17 | |

| LEVEL 6 | | | |
|----------------------|---|---------|--------|
| Course No | Course Name | Credits | Preq |
| 402317 | SEPARATION METHODS AND THERMAL ANALYSIS | 3 | 402311 |
| 402325 | COORDINATION CHEMISTRY | 3 | 402223 |
| 402336 | ORGANIC REACTIONS AND PREPARATIONS | 3 | 402332 |
| 402385 | PETROLEUM CHEMISTRY AND PETROCHEMICALS | 3 | 402333 |
| 601401 | ISLAMIC CLUTURE 4 | 2 | 601301 |
| 605401 | QURAN 4 | 2 | 605301 |
| 402335 | CHEMISTRY OF NATURAL PRODUCTS | 2 | 402333 |
| Total credits | | 18 | |

| FOURTH YEAR | | | |
|----------------------|---|---------|--------|
| LEVEL 7 | | | |
| Course No | Course Name | Credits | Preq |
| 402426 | ORGANOMETALLIC CHEMISTRY | 2 | 402325 |
| 402427 | MECHANISM OF REACTIONS AND SPECTROSCOPY | 2 | 402325 |
| 402428 | CHEMISTRY OF SOLID STATE | 2 | 402325 |
| 402445 | ADVANCED KINETIC CHEMISTRY | 2 | 402343 |
| 402447 | ADVANCED ELECTROCHEMISTRY | 2 | 402245 |
| 402487 | POLYMER CHEMISTRY | 3 | 402336 |
| 402424 | NUCLEAR CHEMISTRY | 1 | 402223 |
| Total credits | | 14 | |

| LEVEL 8 | | | |
|----------------------|--|---------|--------|
| Course No | Course Name | Credits | Preq |
| 402413 | SELECTED TOPICS IN ANALYTICAL CHEMISTRY | 2 | 402317 |
| 402429 | SELECTED TOPICS IN INORGANIC CHEMISTRY | 2 | 402325 |
| 402446 | SOLUTION CHEMISTRY AND KINETIC THEORY OF GASES | 2 | 402445 |
| 402433 | SELECTED TOPICS IN ORGANIC CHEMISTRY | 3 | 402336 |
| 402435 | ADVANCED ORGANIC CHEMISTRY | 3 | 402336 |
| 402495 | RESEARCH PROJECT | 2 | 402427 |
| Total credits | | 14 | |

According to the Self-Assessment Report the following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved by the Bachelor's degree programme Microbiology:

| Program Learning Outcomes | |
|---|--|
| Knowledge | (1)- To know the ethics of microbiology and related areas of science. (2)- To design methods for analyzing and solving problems in the field of microbiology and its applications. (3)- To think critically in evaluating microbiological information. (4)- To implement projects related to his study in microbiology program. |
| Cognitive Skills | (1)- To understand the importance of scientific research and look at the recent advances in microbiological sciences. (2)- To prepare, explore, identify, analyze and evaluate various scientific problems and solutions. (3)- To compare and contrast the methods of scientific research and the ability to design and evaluation of scientific research. |
| Interpersonal Skills & Responsibility | (1)- To involve working independently and with multi-disciplinary teams. (2)- To cooperate in providing scientific and technical services in various fields for all sectors. (3)- Bear responsibility in various situations. |
| Communication, Information Technology, Numerical | (1)- To use the computer to prepare written reports, evaluate scientific data and calculations. (2)- To use the internet to conduct search for published articles and books. |
| Psycho-motor | (1)- To perform basic and advanced microbiological laboratory techniques. (2)- To be able to operate laboratory instruments. |

The following curriculum is presented:

| FIRST YEAR | | | |
|---------------|--|---------|-------|
| LEVEL 1 | | | |
| Course No. | Course Name | Credits | Preq. |
| 4021101 | GENERAL CHEMISTRY | 4 | - |
| 601101 | ISLAMIC CULTURE 1 | 2 | - |
| 7001401 | ENGLISH LANGUAGE | 4 | - |
| 4041101 | MATHEMATICS (CALCULUS) | 4 | - |
| 605101 | HOLY QURAN 1 | 2 | - |
| Total credits | | 16 | |

| LEVEL 2 | | | |
|---------------|-----------------------------------|---------|---------|
| Course No. | Course Name | Credits | Preq |
| 4011101 | GENERAL BIOLOGY | 4 | |
| 7001401 | ENGLISH FOR APPLIED SCIENCE | 4 | 7001401 |
| 4031101 | GENERAL PHYSICS | 4 | |
| 501101 | ARABIC LANGUAGE | 2 | |
| 102101 | BIOGRAPHY OF THE PROPHIT MOHAMMAD | 2 | - |
| Total credits | | 16 | |

| SECOND YEAR | | | |
|----------------------|---|---------|---------|
| LEVEL 3 | | | |
| Course No | Course Name | Credits | Preq |
| 4012401 | INTRODUCTORY MICROBIOLOGY | 4 | 4011101 |
| 4012041 | BIOSTATISTICS | 3 | |
| 605201 | HOLY QURAN 2 | 2 | 605101 |
| 601201 | ISLAMIC CULTURE 2 | 2 | 601101 |
| 4022301 | ORGANIC CHEMISTRY | 4 | 4021101 |
| Total credits | | 15 | |

| LEVEL 4 | | | |
|----------------------|------------------------------|---------|---------|
| Course No | Course Name | Credits | Preq |
| 4012412 | VIROLOGY | 2 | 4012401 |
| 4012422 | BACTERIOLOGY | 3 | 4012401 |
| 4012432 | MYCOLOGY | 3 | 4012401 |
| 4012252 | PHYCOLOGY | 3 | 4011101 |
| 4012312 | BIOCHEMISTRY | 3 | 4022301 |
| 605301 | HOLY QURAN 3 | 2 | 605201 |
| Total credits | | 16 | |

| THIRD YEAR | | | |
|----------------------|---|-----------|-----------------------------------|
| LEVEL 5 | | | |
| Course No | Course Name | Credits | Preq |
| 4013421 | ANTIMICROBIAL AGENTS | 3 | 4012422 + 4012432 |
| 4013321 | HAEMATOLOGY | 3 | 4011101 |
| 4013431 | WATER AND WASTEWATER MICROBIOLOGY | 3 | 4012422 |
| 4013441 | PLANT PATHOLOGY AND DISEASE CONTROL | 3 | 4012412 + 4012422 + 4012432 |
| 601301 | ISLAMIC CULTURE 3 | 3 | 601201 |
| 605401 | HOLY QURAN 4 | 2 | 605301 |
| Total credits | | 17 | |

| LEVEL 6 | | | |
|----------------------|--|-----------|----------------------|
| Course No | Course Name | Credits | Preq |
| 4013452 | MICROBIAL PHYSIOLOGY | 3 | 4012401 + 4012312 |
| 4013472 | MEDICAL MICROBIOLOGY | 3 | 4012422 |
| 4013462 | MOLECULAR MICROBIOLOGY | 3 | 4012401 + 4012312 |
| 4013311 | MEDICAL PARASITOLOGY | 3 | 4012401 |
| 4013372 | IMMUNOLOGY | 3 | 4013321 |
| 4013953 | RESEARCH PROJECT | 3 | |
| Total credits | | 18 | |

| FOURTH YEAR | | | |
|----------------------|---|---------|----------------------|
| LEVEL 7 | | | |
| Course No | Course Name | Credits | Preq |
| 4014401 | BIOTECHNOLOGY | 3 | 4013462 |
| 4014421 | FOOD MICROBIOLOGY | 3 | 4012422 + 4013452 |
| 4014451 | EPIDEMIOLOGY | 2 | 4013472 |
| 4014431 | CYANOBACTERIA | 3 | 4012422 |
| 4014441 | INDUSTRIAL MICROBIOLOGY | 4 | 4013452 |
| 4014412 | PETROLEUM MICROBIOLOGY AND BIOREMEDIATION | 3 | 4013452 + 4022301 |
| Total credits | | 18 | |

| LEVEL 8 | | | |
|----------------------|--|---------|----------------------|
| Course No | Course Name | Credits | Preq |
| 4014462 | MICROBIAL TOXICOLOGY | 2 | 4013472 |
| 4014482 | FOOD QUALITY CONTROL | 2 | 4014421 |
| 4014492 | SOIL MICROBIOLOGY | 3 | 4012422 + 4012432 |
| 4014472 | ENVIRONMENTAL MICROBIOLOGY | 3 | 4012422 + 4013452 |
| 4014182 | BIOINFORMATICS | 2 | 4014401 |
| 601401 | ISLAMIC CULTURE 4 | 2 | 601301 |
| 4014953 | PRACTICAL FIELD TRAINING | 4 | |
| Total credits | | 18 | |