



ASIIN Seal

Accreditation Report

Bachelor's Degree Programmes

Ba Microbiology

Ba Biochemistry

Ba Chemistry

Ba Zoology

(Male Campus)

Provided by

King Saud University

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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
Ba Microbiology	/	ASIIN	ASIIN Seal 2011-2016	09, 10
Ba Biochemistry	/	ASIIN	ASIIN Seal 2011-2016	09, 10
Ba Chemistry	/	ASIIN	ASIIN Seal 2011-2016	09, 10
Ba Zoology	/	ASIIN	ASIIN Seal 2011-2016	09, 10
<p>Date of the contract: 13.12.2016</p> <p>Submission of the final version of the self-assessment report: 07.06.2017</p> <p>Date of the onsite visit: 27.-29.11.2017</p> <p>at: Riyadh</p>				
<p>Peer panel:</p> <p>Prof. Dr. Alois Palmeshofer, University Würzburg (paper-based)</p> <p>Prof. Dr. Heinrich Lang, Technical University Chemnitz</p> <p>Dr. Dietrich Scherzer, BASF</p> <p>Prof. Dr. Oliver Müller, University of Applied Sciences Kaiserslautern</p>				
<p>Representative of the ASIIN headquarter: Dr. Martin Foerster</p>				
<p>Responsible decision-making committee: Accreditation Commission for Degree Programmes</p>				

¹ ASIIN Seal for degree programmes.

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

<p>Criteria used:</p> <p>European Standards and Guidelines as of 15.05.2015</p> <p>ASIIN General Criteria, as of 10.03.2015</p> <p>Subject-Specific Criteria of Technical Committee 09 – [Chemistry] as of 2 December 2011; Technical Committee 10 - [Life Sciences] as of 9 December 2011.</p>	
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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
Microbiology	B.Sc.	/	6	Full time	/	8 Semester	136 credit hours	Fall Semester
Biochemistry	B.Sc.	/	6	Full time	/	8 Semester	136 credit hours	Fall Semester
Chemistry	B.Sc.	/	6	Full time	/	8 Semester	136 credit hours	Fall Semester
Zoology	B.Sc.	/	6	Full time	/	8 Semester	136 credit hours	Fall Semester

For the Bachelor's degree programme Microbiology the institution has presented the following profile in the programme Handbook:

„The Department of Botany and Microbiology is an educational institution and research responsible for the development and publication of knowledge in different areas of plant science and microbiology. The Department of Botany and Microbiology provides excellent opportunities for higher education in accordance with high academic standards in all areas of knowledge related to plant science and microbiology. Its efforts are aimed at all levels of interested Saudis and others to contribute to their qualification to participate in the comprehensive development through their various roles such as the General education in the Ministry of Education, Higher Education, the Saudi universities, the Ministry of Health, the Ministry of Agriculture, the Ministry of Water and Electricity, the Ministry of Trade and Industry, the General Authority for Standardization, the General Authority for Metrology

³ EQF = The European Qualifications Framework for lifelong learning

and Environment Protection, the National Commission for Wildlife Conservation and Development, and various private institutions. The Department works on the continuous development of knowledge through scientific research to provide practical solutions and specialized professional advice to institutions dealing with services, productivity and development processes to help them perform their duties in the overall development. The Department is also interested in raising intellectual and cultural awareness of the community and the protection of the environment.”

For the Bachelor’s degree programme Biochemistry the institution has presented the following profile in the self-assessment report:

„Biochemistry is a multidiscipline field of science that deals with living systems of all organisms, and thereby, intertwines with many versatile disciplines such as: medicine, pharmacy, chemistry, zoology, botany, microbiology, and agriculture and even computer science. The Biochemistry program has always tried to establish ties with industry and/or professional groups, mostly to improve the employment prospects of our graduates. The program communicates, through the Head or faculties with representatives from industry, government agencies and academia to advise the program on current trends and requirement.“

For the Bachelor’s degree programme Zoology the institution has presented the following profile in the self-assessment report:

“Zoology is central to our understanding of the world. Zoologists seek to discover the fundamental principles that underpin animal life focusing on the diversity, function and structure of animals and thus providing the scientific bases for our knowledge both of the creatures with whom we share this planet and of ourselves.

The Zoology department strives to create an environment that enables teaching and research to attain high levels of excellence and to enable its members to achieve their full potential.

OZD. 1: Prepare highly qualified educators and technicians using all possible means.

OZD. 2: Develop a curriculum that is responsive to the needs of the employment market.

OZD. 3: Prepare pure and applied researches and publish them in well known and respected international periodicals.

OZD. 4: Connected with the community to provide all possible educational programs that can solve problems and increase their awareness.

Mission of the College of Science:

To offer study programs and developed research projects capable of providing society with knowledge and trained personnel through a stimulating environment for learning, creativity and scientific research with continuing quality to ensure optimal use of technology and general partnership.”

For the Bachelor’s degree programme Chemistry the institution has presented the following profile in the self-assessment report:

“Department of Chemistry was founded in 1378-1379 H. (corresponding to 1958/1959 A.D.) with the foundation of College of Science, which is one of the oldest colleges at King Saud University and was the first scientific college in the Arabian Peninsula.

Chemistry program was established to provide the Kingdom with scientific leaders in the different sectors and to:

- Development of Chemical industries in the Kingdom.
- Serving the petroleum, petrochemical, pharmaceutical, mining, food, detergents and other Chemical industries.
- Preparing highly qualified chemists for research and development laboratories.
- Preparing leaders for kingdom sustainable development.
- Safety awareness on health hazards and proper use of Chemicals and environmental protection.
- Supporting lifelong learning ensuring continued intellectual growth and welfare of society.”

C Peer Report for the ASIIN Seal

1. The Degree Programme: Concept, content & implementation

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

Evidence:

- Self-Assessment Reports Zoology, Biochemistry, Chemistry and Microbiology
- Website of the Bachelor programme in Chemistry: <https://sciences.ksu.edu.sa/en/node/829> (accessed on 18 December 2017)
- Website of the Bachelor programme in Biochemistry: <https://sciences.ksu.edu.sa/en/node/861> (accessed on 18 December 2017)
- Discussion during the on-site visit

Preliminary assessment and analysis of the peers:

The objectives and learning outcomes of the respective programmes were analysed by the peers on the basis of more or less detailed descriptions in the self-assessment reports as well as several attachments such as study plans and handbooks. Programme objectives are also presented for the programmes in Chemistry and Biochemistry on the respective websites. Thus, the peers were able to gather all relevant information but indicated that programme objectives should be presented in English language in a more or less homogenous form on the websites of all degree programmes.

The learning outcomes for the students were found to be aligned with the National Qualifications Framework (NQF) of Saudi Arabia as stipulated by the National Commission for Academic Accreditation & Assessment. The panel positively noted that all modules were linked to the NQF as well as to corresponding teaching and assessment methods.

The peers refer to the **Subject-Specific Criteria (SSC)** of the Technical Committees of Chemistry and Life Sciences as a basis for judging whether the intended learning outcomes of the four Bachelor's programmes, as defined by KSU, correspond to the exemplary constituted learning outcomes of these Technical Committees. The auditors examined the areas of

competence as set forth by the Subject-Specific Criteria for degree programmes and came to the following conclusions:

According to the website the students of the Bachelor programme in Chemistry gain basic knowledge in the concepts and basic theory of chemistry. All students in the four programmes under review additionally have to pass an introductory year in which they are acquainted with basic knowledge in mathematics and natural sciences. Further, graduates of the programmes should be able to work in laboratories independently adhering to the necessary safety regulations. They shall have the skill to conduct chemical reactions and to prepare and identify chemicals. Generally they should be able present the results of their scientific research activities, work in teams and to continue their learning in a life-long process in order to keep up-to-date with professional developments. They are aware of sustainable developments in their field and their responsibility for negative impacts on the environment. They acquire competences in academic writing and are thus prepared to continue their studies on a Master level.

In the Bachelor programme of Biochemistry students gain “in-depth knowledge of basic biochemistry principles together with a clear understanding of interdisciplinary areas such as molecular biology, immunology, toxicology, biotechnology and human nutrition”. They are enabled to critical thinking in the performance, design, interpretation and documentation of laboratory experiments and can interpret and present data, using appropriate qualitative and quantitative techniques. Being aware of professional and scientific ethics related to the field they possess the necessary skills to independently research, describe and analyse in reading and writing and to present their research results to a public audience. All this they can do on their own but also in teams through their advanced communicative competences. After graduating the students can be employed in industry or continue their studies on Master level.

The Bachelor programme of Microbiology pursues the goal to convey the basic principles of Natural Sciences and Mathematics, Microbiological Sciences (Taxonomy, Physiology, Pathology, Genetics, etc.) as well as the basics of biotechnology used for the diagnosis of the molecular and cellular disease. Students are enabled to do research on their own and in groups, document their findings and to publicly present the results. Graduates are competent to work in chemical, clinical and biological labs, where they can independently carry out experiments being aware of the required safety regulations. Through their acquired skills and data statistical analysis and scientific essay writing they are able to choose after graduation to work in industry or to continue their studies on a Master level.

Students of the Bachelor programme of Zoology are also being acquainted with the basic principles of Mathematics and Natural Sciences during their preparatory year. Further, students gain command of the fundamentals of Zoology and the interrelations among organisms and their biosphere. Further, they gain knowledge of the management and concepts of bio-systems, organization and evaluation. In practice graduates have the competences required to design and conduct experiments in Zoology, analyze data, interpret results, and write biological reports. They can communicate effectively through written reports, in team work or public discussions and presentations and develop life-long learning skills which also enable them to continue their research on the level of a Master programme.

Consequently, the peers conclude that the Subject-Specific Criteria of Chemistry and Life Sciences are generally covered in the learning objectives of all four degree programmes under review.

Concerning the employment opportunities the peers found ample descriptions of respective possibilities in the respective documentations. Also the discussions during the on-site-visit revealed, that the programmes' graduates have very good options on the job market. To the contrary, during the discussion with industry representatives it became obvious to the peers that some employment areas suffer from a lack of student interest although interesting jobs are being offered. As in the case of Zoology industry representations expressed their wish for a more intense co-operation with the Department representatives that would allow for a better information and promotion of practical experience and job opportunities to the students. The peers learned that a job fair is held regularly once a semester where employers can inform students about their activities. Nonetheless, the peers do take the demand from industry seriously and recommend to further enhance the collaboration with future employers. This will be chiefly discussed in the context of the work practice (see criterion 1.3)

Criterion 1.2 Name of the degree programme

Evidence:

- Self-Assessment Reports Zoology, Biochemistry, Chemistry and Microbiology

Preliminary assessment and analysis of the peers:

The panel considered the names of all four programmes to fully reflect their objectives and content and thus to be entirely adequate.

Criterion 1.3 Curriculum

Evidence:

- Self-Assessment Reports Zoology, Biochemistry, Chemistry and Microbiology
- Download-platform for pdf study plans of all Bachelor degree programmes (accessed 02nd January 2018): <https://sciences.ksu.edu.sa/en/node/1101>

Preliminary assessment and analysis of the peers:

For all four study programmes curricula and study plans were presented and the peers could see that they are also made transparent online. Further, as outlined under criterion 1.1 the auditors could see that the intended learning out-comes are in line with the Subject-Specific Criteria (SSC) of the Technical Committees of Chemistry and Life Sciences. The peers base their assessment whether the curricula of the different degree programmes are suitable to achieve the intended learning outcomes on the module descriptions and the study plans. The overall objectives and intended learning outcomes for the degree programme are systematically substantiated in modules and it is clear for the peers which knowledge, skills and competences students will acquire in each module.

For all degree programmes under review it has already been stated that all students pass a preparatory year that includes general subjects of natural sciences (most importantly the “Introduction to Mathematics”), “Computer skills”, “Communication skills” and “English”. Further, the peers learned that the preparatory year in the form now presented will be changed within the next years insofar as the College of Science will gain more responsibility over the design and the contents. This modification seemed to be the right step in the perspective of the peers in order to achieve a more subject-oriented approach in this otherwise helpful introductory year. The peers agree that communication skills and English, etc. are important qualifications but they also see that valuable time may be lost for the respective subjects to convey important basic knowledge and information during the first months of study. Hence, many of those who successfully complete the first year change their course of study to other, more “attractive” subjects, which is extremely lamentable for the smaller subjects such as Zoology. From the discussion with the industry representatives the peers learned that they would welcome to be more actively involved during these first semesters in order to present to the students the full range of attraction the respective subjects offer. The peers strongly recommend to accept this offer of mutual support and to strengthen the subject-specific information presented in the first year in co-operation with industry partners. Another aspect raised by the industry representatives were missing competences in English and communication. This may be so due to the fact that all student take courses in these subjects in the first year but not necessarily afterwards. Thus, the peers recommend to strengthen these soft skills in the curricula of all four programmes under review.

Starting from the third semester all programmes offer different curricula which in general are up-to-date according to the peers' assessment. In Chemistry the second year serves as a general introduction with courses such as "General Chemistry 1+2" and "General Physics", "Chemistry of Main Groups" or "Organic Chemistry". Courses in the third year are getting more specialized introducing subjects such as "Spectroscopic Methods", "Chemical Kinetics" or "Polymers and Petrochemistry". Students also start taking the first elective courses which are separated between Chemistry-specific electives and general electives that may also be used for interdisciplinary work or the acquisition of soft skills. The last year is eventually nearly completely dominated by elective courses that allow for individual specializations of the students. Very positively was noticed by the peers that a research project has been introduced, not only in Chemistry but in all degree programmes under review. These individual capstone-projects will be discussed in more detail under criterion 3. In conclusion, the peers agreed that the curriculum of the Ba Chemistry is well-qualified to achieve the learning outcomes described above. Nevertheless, the peers noticed that aspects of homogenous and heterogeneous catalysis are not as present as they should be and recommended to strengthen this aspect in the future development of the programme.

The structure of the Bachelor programme Biochemistry was found to be quite similar. The second year is now spent on general introductions and basic knowledge in courses such as "General Chemistry", "Microbiology", "Principles of general Zoology", or "General Biochemistry". Only in the third year of study the courses convey more specific contents in the field of Biochemistry with courses of "Cellular Biochemistry", "Experiments in Enzymology" or "Molecular Biology" while the last year offers more space for individual specializations as well as research. The elective options are much more limited, leaving choices mostly in the seventh and eighth semester. However, the peers were of the opinion that the programme includes all relevant aspects and leaves sufficient space for individual specialization before possibly entering a Master programmes. Equally to the Bachelor programme.

In Mircobiology students of the second year are also being acquainted with basic principles of the subject through courses such as "General Microbiology", "Laboratory skill" and introductions to Virology, Bacteriology and Mycology. Further, in each semester they choose one course from the University requirement as in all other Bachelor programmes. These courses comprise subjects on Islamic Religion and Law as well as Ethics. The peers welcomed that the participation in these courses is not restricted to Muslims but that students of all religions can take part in them. This was considered to be important in the light of the University's aim for more internationalization. Thus, the programmes are open to students from all over the world. In last four semesters Microbiology students gain more specific knowledge in courses such as "Biology of Microalgae", "Microbial Diagnosis" or "Sanitation and Water Microbiology" but also a broad variety of subject-specific electives. The research

project is already part of the seventh semester but in size identical to the other degree programmes. Thus, in the last semesters students have an intensive “Training in medical microbiology laboratories” in combination with specialized elective courses. The peers welcome this increased practical approach in comparison to the previous accreditation.

In the Bachelor programme of Zoology students follow a similar structure by taking introductory courses on the subjects of “General Botany”, “Principles of General Zoology” or “Parasitology” in the second year of study. Afterwards subjects are much more specialized including aspects ranging from “Ichthyology” or “Ornithology” in the fifth and sixth semester to “Principles of descriptive embryology” or “immunology” in the seventh and eighth semester. Between the sixth and the seventh semester students also participate in “Field studies”; an important practical approach positively approved by the peers. As with all other degree programmes the studies complete with the preparation of an individual graduation project in the eighth semester.

In conclusion, the peers had a good impression of the composition of all curricula that were mostly up-to-date and might only be modified in small parts. In any case, they are well-designed in order to develop the described competences as exemplified in the Subject-Specific Criteria of ASIIN and the level 6 competences of the European Qualification Framework. The practical experience was raised in all programmes significantly as a consequence of the previous accreditation in 2011. However, following the opinion of students, industry and peers, hands-on-experience through internships could be further enhanced. Thus, in most cases, the practical approaches as part of the courses are deemed to be sufficient but it would be recommendable to bring students into contact with actual practical work in enterprises and thus to strengthen the cooperation between University and Industry.

Criterion 1.4 Admission requirements

Evidence:

- Self-Assessment Reports Zoology, Biochemistry, Chemistry and Microbiology
- Admission website (is only available in Arabic; accessed 03.01.2018): <http://dar.ksu.edu.sa/en/e-admission>
- New Student Guide Book of King Saud University (annexed to the self-assessment report)
- Programme Handbooks
- Discussions with management, teaching staff and students

Preliminary assessment and analysis of the peers:

The admission requirements for the programmes are made transparent in the programme handbooks as well as on the university website. Student surveys confirmed that the admission requirements and process were transparent. Generally, in line with national regulations, a secondary school certificate granting access to higher education is mandatory. The peers understood that all students who enter the College of Science need to conduct a preparatory year to ascertain that all students have obtained basic skills before they can study the professional degree programme. After the Preparatory Year, an additional acceptance grade is defined to be able to continue on to the second year. The necessary *grade point average* (GPA) levels for different degree programmes differ. The students can indicate three wishes which programme they actually want to study and depending on the GPA they are allocated to the different programmes. The programme coordinators highlighted that most students are interested in subjects like medicine or engineering sciences; as mentioned above smaller programmes or those appearing less attractive or with less job opportunities such as is the case with Zoology and some of the other programmes under review are often neglected. The panel was informed that activities such as job fair and information day are regularly held during the preparatory year in order to inform the students about the opportunities they have with the respective subjects. Nevertheless, as has already been outlined above, the cooperation could still be improved, an issue also mentioned by the industry representatives. While in the case of Chemistry large companies are eager and capable to attract good students without difficulties the peers saw the necessity that in smaller programmes enterprises and programme coordinators should work more closely together thus outlining job opportunities and interesting fields of research. As was mentioned before, the peers also welcomed the fact that the preparatory year will in future be more subject-oriented thus allowing for more subject-specific information that can be conveyed already during the first year.

In summary, the auditors confirm that the requirements and procedures for admission for all programmes are transparent and clear. All applicants are treated according to the same standards and regulations.

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

[...]

2. The degree programme: structures, methods and implementation

Criterion 2.1 Structure and modules
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Evidence:

- Self-Assessment Reports Zoology, Biochemistry, Chemistry and Microbiology
- Download-platform for pdf study plans of all Bachelor degree programmes (accessed 02nd January 2018): <https://sciences.ksu.edu.sa/en/node/1101>
- Programme Handbooks, including transfer regulations
- Discussions with management and teaching staff during onsite visit

Preliminary assessment and analysis of the peers:

Modularization:

All study programmes under review are modularized. The peers determine that each module is a sum of teaching and learning whose contents are concerted. Most of the modules of the Bachelor's degree programmes encompass between 2 and 3 credit points (with some few exceptions). The structure of the programme as well as the individual modules was found to be coherent and consistent. The results from satisfaction surveys from students and teaching staff also did not show any area of concern with regard to the structure or possible overlap.

Depending on the GPA achieved by students, they are allowed to take courses for a maximum of 20 contact hours per week. In case the GPA drops, students are asked to take fewer courses in order to achieve the intended competences. The panel considered this practice adequate though it might lead to slightly longer study durations. Overall, they found that most students completed their programme within 4 to 5 years.

Student mobility

International mobility is organized on an institutional level and currently takes place in the form of summer schools at international universities or research centres. KSU highlights that international mobility is particularly emphasised in the Master's and PhD programmes where the second supervisor needs to come from a foreign university and parts of the programme need to be carried out at an international partner university. However, during the discussion with teaching staff and programme coordinators the point was brought up that there is no actual mobility window for Bachelor students in neither of the programmes under review. Students do not really have the opportunity to pass a full semester abroad although the University highlights the importance of internationalization. The programme coordinators lamented this circumstance and underlined that bilateral agreements with

international universities would be very helpful to establish such opportunities. Although the peers could understand that going abroad for a semester or longer is not an option for many Saudi students during the Bachelor programme they support the coordinators' ambitions, especially since international partnerships would lead to a higher number of international students visiting KSU and hence increase the academic dialogue.

Recognition of achievements and competences

The recognition of achievements and competences obtained at another university or outside the tertiary education sector is governed by the university regulations. The panel understands that a transfer from another university is very rare. In such cases, the procedures for checking the courses and competences are followed.

Criterion 2.2 Work load and credits

Evidence:

- Self-Assessment Reports Zoology, Biochemistry, Chemistry and Microbiology
- Download-platform for pdf study plans of all Bachelor degree programmes (accessed 02nd January 2018): <https://sciences.ksu.edu.sa/en/node/1101>
- Discussions with management and teaching staff during onsite visit
- Course specifications attached to the self-assessment-reports

Preliminary assessment and analysis of the peers:

The Bachelor's programmes have a credit point system in place. As a rule, the modules are valued at 2 or 3 Saudi Arabian credit points. One credit point is awarded for 1 hour of lectures or 2 hours of tutorial or lab. Between 15 and 19 credit points are awarded per semester. The Bachelor's project is valued at 3 Saudi Arabian credit points. According to the last ASIIN report and to the programme coordinators, the allocation of credit points to individual modules is based on experiences from previous degree programmes. During the onsite-visit the programme coordinators explained, that the number of credit points awarded for the Bachelor's Project does not reflect the actual workload invested by the students to complete the module. Moreover, the three hours are simply the contact hours each student has in an individual class or meeting with his supervisor discussing questions around his project. How much work the student invests in the actual development of the project is up to him; consequently, the results of the projects differ in quality, although the peers were of the opinion that they generally reflect an adequate level of knowledge. In any case, the peers recommended to establish some measurement for the average workload that

students need to fulfil in order to prepare the project. This would not necessarily mean to change the number of credits but it should be made transparent for example in which timeframe maximum and minimum the work has to be prepared. This would be important first of all to make the works more comparable to each other and to improve their evaluation by international (especially European) HEIs and employers.

As the credit point system used in Saudi Arabia only encompasses the presence hours and not additional students' self-study, the auditors did not find the system comparable to the ECTS system (European Credit Transfer System), as also already considered in the previous ASIIN report. Since the course descriptions already contain indications about the expected weekly self-study time, they assumed the university capable of making a comparison of their credit point system to the ECTS system. They judged this helpful for those graduates wishing to pursue further studies at a university in the European Higher education Area.

The peers take positive note that the Course Evaluation Survey (CSE) includes the question "The amount of work I had to do in this course was reasonable for the credit hours allocated" which demonstrates that KSU checks each semester systematically whether the overall workload of students is adequate. The students confirm that it is possible to finish the study programmes in the assigned 8 semesters. In summary, the auditors conclude that there is no structural pressure on the quality of teaching and the level of education due to the workload. The workload seems to be realistic and peaks in the workload are avoided.

Criterion 2.3 Teaching methodology

Evidence:

- Self-Assessment Reports Zoology, Biochemistry, Chemistry and Microbiology
- Download-platform for pdf study plans of all Bachelor degree programmes (accessed 02nd January 2018): <https://sciences.ksu.edu.sa/en/node/1101>
- Discussions with management and teaching staff during onsite visit
- Course specifications attached to the self-assessment-reports

Preliminary assessment and analysis of the peers:

The didactical concept includes elements such as traditional lectures, blended learning (traditional and online), e-learning and lab work. Most courses consist of theoretical and practical elements which the peers consider to be a significant improvement resulting from the previous accreditation. Groups are normally made up of no more than 40-45 students for lectures and 20-25 students for labs. Usually, two or three students jointly complete an

experiment, three staff members are present during the lab session (lecturer, technician/assistant, demonstrator). Oral presentations have also been introduced as a result of the previous accreditation. As especially important is considered the oral presentation of the final research project which is now compulsory for all students and forms a significant part of the project's grade.

Consequently, the auditors gained the impression that the teaching methods used for implementing the didactical concept are appropriate to support the attainment of the learning objectives.

Criterion 2.4 Support and assistance

Evidence:

- Self-Assessment Reports Zoology, Biochemistry, Chemistry and Microbiology
- Discussions with management and teaching staff during onsite visit
- Programme Handbooks
- Websites of the respective programmes:
 - Zoology: <https://sciences.ksu.edu.sa/en/zoology>
 - Chemistry: <https://sciences.ksu.edu.sa/en/node/203>
 - Biochemistry: <https://sciences.ksu.edu.sa/en/node/205>
 - Microbiology: <https://sciences.ksu.edu.sa/en/node/207>

Preliminary assessment and analysis of the peers:

The peers examine the measures of support and assistance for the students in all four degree programmes under review and come to the conclusion that a great variety of information is presented on each programme and additional support measures. Nevertheless, at least the English version of the websites are still of different quality; not all of them inform in an equal degree about the programme objectives and the module descriptions or the information are given in different places (sometimes as part of the study plan, sometimes on the website, sometimes in the programme handbook). Although the peers got all the information required and the students confirm that they can obtain all relevant information the peers deem it recommendable that the presentation of relevant information in English should be homogenized in order to achieve greatest transparency. At the beginning of each semester the students receive the syllables for the different modules. For programme related information they can ask senior students; there is also an advisor who can be addressed for more detailed information about specific courses or electives. The pro-

fessors can also be approached if need arises. The auditors conclude that KSU makes adequate resources available to provide individual assistance, advice and support for all students.

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

[...]

3. Exams: System, concept and organisation

Criterion 3 Exams: System, concept and organisation

Evidence:

- Self-Assessment Reports Zoology, Biochemistry, Chemistry and Microbiology
- Download-platform for pdf study plans of all Bachelor degree programmes (accessed 02nd January 2018): <https://sciences.ksu.edu.sa/en/node/1101>
- Discussions with management and teaching staff during onsite visit
- Course specifications attached to the self-assessment-reports

Preliminary assessment and analysis of the peers:

The examinations in the respective programmes can have the form of quizzes and homework (also through electronic devices), written mid-term and written final exams, seminar and project discussions, practical lab exam, and practical reports. As a rule, the graduation project includes a mandatory colloquium, normally including a presentation (compare criterion 2.3).

Failed exams cannot be repeated without repeating the whole module, but the number of their repetitions is unlimited. Some courses are also offered during summer holidays in a compact version offering the students the possibility to repeat a course without losing a semester entirely. This, however, depends on the teachers' willingness to do so. Students can also drop a course if they feel they cannot pass the final exam. Modules are offered each semester, all electives are offered at least once per year (the minimum group size for electives is five). Depending on the grade point average reached in the previous semester, students are allowed to take more or less courses. The programme coordinators explained that this rule helps to give students who have failed an exam more time to study.

The exam period of two weeks is held at the end of each semester. No more than two exams can take place during one day. Registration is made online. Make-up exams for students who could not attend the mid-term exams due to illness are held one week before the final exams.

Grades for each module are calculated on a specific basis detailed in the course description, depending on the number of exams taken. The grade point average per semester or for the whole program is calculated taking into account the credits for each module. The students confirmed that all rules and regulations regarding exams, calculation of grades and pass rates as well as scheduling and re-sits were clear to them and transparently described.

The final thesis has already been discussed elsewhere. In general, the peers agreed that the bachelor theses as well as the exams presented to them showed an adequate level of knowledge although in the case of the final papers it was already mentioned that it was not clear in what time the results were achieved. In order to reach greater international comparability it was recommended to indicate the period of time in which students work on the final project.

In conclusion, the auditors gained the impression that the chosen exam types are oriented at the learning objectives defined for the individual modules. They positively noted that the number of oral presentation and practical exams has been increased since the last accreditation and that the programme coordinators were eager to diversify the examination methods while guaranteeing at the same time a great transparency regarding the regulations.

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

[...]

4. Resources

Criterion 4.1 Staff

Evidence:

- Self-Assessment Reports Zoology, Biochemistry, Chemistry and Microbiology
- CVs of teaching staff
- Faculty Employment and Promotion Regulations

- Scientific Research Policy
- Reports on Research Strategic Plan
- Discussions with students, teaching staff and management

Preliminary assessment and analysis of the peers:

The peers welcome the overview of teaching staff at the different departments that have been provided. The peers analyze the CV's and the referenced websites and conclude that the composition, scientific orientation and qualification of the teaching staff are suitable for successfully implementing the degree programmes; many professors come from other countries and have received their certificates from internationally well-known institutions.

The teaching load with 14 credits for assistant professors and 10 for full professors at first seemed to be quite high but during the on-site discussions the panel understood that these also comprise a reduction of three hours spent on final project modules. Hence, the teaching load is considered to be acceptable and still leaves sufficient time for individual research projects. To increase the number of publications and encourage the teaching staff's research projects different programmes to support younger researchers have been initiated. Additionally, the peers gather that each department has created research groups where researchers can apply to receive funding as long as their area of research is compatible with the overall topic. To increase the attraction of research an additional substantial financial reward is also offered for publications for assistant professors and research professorships that leave more time for individual research. The peers thought it a good idea that the research professors are still being involved in teaching courses of the eighth semesters in order to implicate their researches in practice and to let advanced students participate in their projects.

In conclusion, the peers had no doubt about the adequacy of the teaching staff in all four programmes under review.

Criterion 4.2 Staff development
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Evidence:

- Self-Assessment Reports Zoology, Biochemistry, Chemistry and Microbiology
- Discussions with students, teaching staff and management

Preliminary assessment and analysis of the peers:

Through a Deanship for Skills Development workshops and seminars are being organized at KSU in order to develop the qualification and competences of the teaching staff. Professional training is offered with a yearly programme, especially for new professors who have to attend a certain number of courses and workshops in order to maintain their teaching permission. Further, the peers found it appreciable that teaching staff can obtain certificates through the participation in such courses documenting their advancement in didactical skills. During the discussion with the teaching staff several declared that they regularly participate in the offered courses and consider them to be very helpful for the further development of the teaching quality. Consequently, the peers were ascertained that the offers for staff development are adequate to ensure a high level of teaching and learning in the programmes.

Criterion 4.3 Funds and equipment
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Evidence:

- Self-Assessment Reports Zoology, Biochemistry, Chemistry and Microbiology
- Discussions with students, teaching staff and management

Preliminary assessment and analysis of the peers:

The peers discussed the availability of financial funds with the management and understood that the budget for the departments is divided by the college according to the number of students. The management of the programmes confirmed that the funds provided are sufficient to implement the programmes. On an individual level the discussion with the teaching staff showed a certain decline in fund for research and project although compared with a very high level some years ago. According to some of the staff members it has meanwhile become difficult to get funding in order to attend international conferences. However, the peers agree with some other staff members that generally the funding is sufficient and resources are available and that the level compared with was extremely high; consequently, the panel does not see an immediate necessity to increase the funds although they understand that this would always be helpful to further enhance the international research.

The equipment of the laboratories and classrooms was inspected during a tour of the premises during the on-site-visit. The peers gained a good impression of the campus in general and the learning and teaching facilities it offers. They were also impressed by the high

standards of supporting measures for students with handicaps. Concerning the laboratories the members of the panel realized that a significant improvement compared to the previous accreditation has been achieved. Further, the security and safety measures installed were appreciated. All facilities were adequate to ensure a high-level instruction for the Bachelor programmes under review. It was also made clear that a number of advanced research laboratories are available where even Bachelor students can work independently as part of research projects initiated by the local professors. Altogether, the improvement of the equipment was impressive and allows for the achievement of the learning outcomes aimed at.

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

[...]

5. Transparency and documentation

Criterion 5.1 Module descriptions

Evidence:

- Course descriptions as part of the Self-Assessment Reports of Zoology, Biochemistry, Chemistry and Microbiology
- Course Descriptions online (accessed 4th January 2018):
 - Biochemistry: <http://sciences.ksu.edu.sa/en/node/865>
 - Zoology: https://sciences.ksu.edu.sa/sites/sciences.ksu.edu.sa/files/attach/zool_e_plane_f-with_remark_of_english_courses.pdf
 - Chemistry: http://sciences.ksu.edu.sa/sites/sciences.ksu.edu.sa/files/imce_images/courses_description.pdf
 - Microbiology: https://sciences.ksu.edu.sa/sites/sciences.ksu.edu.sa/files/attach/mbio_program-2-13.pdf

Preliminary assessment and analysis of the peers:

The peers positively noticed that short module descriptions for all programmes under review were accessible online in English language and more detailed descriptions are sometimes being provided in the programme handbook. Especially in the case of the Chemistry programmes the panel found a laudable example of improvement with precise descriptions

of learning outcomes and all required information. Further, the peers understood from the discussion with teachers and students that detailed information about the course content and examination procedures are being made accessible to the students at the beginning of each semester. Nevertheless, it would seem recommendable to generally present the module descriptions in a more homogenous way following the Chemistry example. Thus, in some cases the descriptions are still quite rudimentary not comprising any information on recommended literature, preconditions to take the course, the module responsible, the examination forms or even the number of awarded credits. The peers would think it important that such information should be presented in a concise and unified way to all stakeholders on the website in order to achieve greater transparency.

Criterion 5.2 Diploma and Diploma Supplement

Evidence:

- Missing

Preliminary assessment and analysis of the peers:

The institution does not provide for the award of a Diploma Supplement as it was already the case in the previous review. The peers recommend that shortly after graduation the University should issue such a document together with the diploma in English language.

These documents should provide information on the student's qualifications profile and individual performance as well as the classification of the degree programme with regard to its applicable education system.

The individual modules and the grading procedure on which the final mark is based should be explained in a way which is clear for third parties. In addition to the final mark, statistical data as set forth in the ECTS User's Guide could optimally be included to allow readers to categorize the individual result or degree.

Criterion 5.3 Relevant rules

Evidence:

- Programme Handbooks
- Students Code of Conduct

- Report on Programme Requirements and Regulations

Preliminary assessment and analysis of the peers:

Rules and regulations for students' admission, progression, grading and graduation are published primarily in the Programme Handbooks.

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

[...]

6. Quality management: quality assessment and development

Criterion 6 Quality management: quality assessment and development

Evidence:

- Self-Study Reports, incl. statistical data
- QMS Handbook (2009)
- Survey Results and Analysis
- Quality Policy of the College, Quality Management System
- Action Plan, Alignment, Strategic Plan
- Benchmark Report
- Independent reviewer report and answers
- Discussions with management, teaching staff, students, graduates, employers

Preliminary assessment and analysis of the peers:

The panel found an extensive quality assurance system, an extensive organisational structure and substantial documentation in place. The quality management system is built on several layers of responsibility and activity, on institutional, College and department level.

The system is closely based on the standards and criteria of the national accreditation agency (NCAAA) as well as the EFQM system. Generally, the College of Science and the departments have developed KPIs for each of their objectives which are annually tracked. The responsibility for this lies with the Steering Committee and its working groups, all of

which are jointly implemented by the male and female parts. Annual assessments are implemented to assess the performance on the achievement of objectives. At the same time, the KPIs and benchmarks are used to compare the performance of programmes against each other. An improvement plan is then generated based on the annual check to what extent objectives have been met and to determine improvement actions; responsibilities are assigned.

In the frame of the self-study, carried out every five years, surveys of teaching staff and students are implemented with the aim of ascertaining to what extent the aims and objectives of the programmes are relevant to the daily teaching and learning activities. These surveys also include satisfaction with the provision of teaching and facilities and resources. However, the students reported that they did not receive any feedback on their evaluations and as they progressed to the next level in their studies they could not judge if any changes were implemented. This aspect was also affirmed by the programme coordinators and the teaching staff that seemed aware of this lacking element. Consequently, the peers recommend closing the feedback loops to further develop the quality of the degree programmes.

A graduate database was understood to be in the process of being developed. While in principle the contact details of all graduates were available, it appeared that not much systematic use was made of this information. Similarly, personal relations to certain employers existed and companies were formally involved in enhancement surveys and advisory meetings. However, the panel gained the impression that more effects could be achieved to make use of this information and contacts on programme, rather than college or university level. The panel supported the proposals to organize meetings between these groups with a view to both informing students about future employment opportunities but also to gathering information about skills needed in the labour market that can be used to continuously enhance the programmes.

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

[...]

D Additional Documents

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

Additional Documents

No additional documents needed.

E Comment of the Higher Education Institution (22.01.2018)

King Saud University abstains from commenting on the report. They are satisfied as it is.

F Summary: Peer recommendations (02.03.2018)

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

Degree Programme	ASIIN-seal	Subject-specific label	Maximum duration of accreditation
Ba Zoology	With requirements for one year	n.a.	30.09.2025
Ba Biochemistry	With requirements for one year	n.a.	30.09.2025
Ba Chemistry	With requirements for one year	n.a.	30.09.2025
Ba Microbiology	With requirements for one year	n.a.	30.09.2025

Requirements

For all degree programmes

- A 1. (ASIIN 5.2) Ensure that a Diploma Supplement is given to graduates which 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.
- A 2. (ASIIN 1.1) Ensure, that the educational objectives/learning outcomes of the programmes are published on the website in a way consistent with the programmes' presentation in the department handbooks.

Recommendations

For all degree programmes

- E 1. (ASIIN 5.1) It is recommended to rewrite the module descriptions so as to always include concise information about the responsible professor, recommended literature, examination forms and learning outcomes.
- E 2. (ASIIN 2.2; 3) It is recommended to clearly outline the student workload for the final project in order to achieve higher international compatibility. Further, a clear identification as an equivalent to the Bachelor thesis would be helpful.
- E 3. (ASIIN 1.3) It is recommended to strengthen aspects of soft skills such as English language communication, economy and business leadership, and oral presentation competences in the curricula.
- E 4. (ASIIN 1.3; 1.4) It is recommended to further improve the communication between the departments and other stakeholders (industry) pointing out job opportunities and enhancing practical experiences (via internships or excursions).
- E 5. (ASIIN 2.1) It is recommended to increase the number of bilateral cooperation agreements and to indicate a mobility windows in order to enhance the students' opportunities to study one semester abroad during the Bachelor programmes.
- E 6. (ASIIN 6) It is recommended to ensure that students get an institutionalised feedback about the evaluation results.

For the Bachelor's degree programme Chemistry

- E 7. (ASIIN 1.3) It is recommended to strengthen contents of homogenous and heterogeneous catalysis in the curriculum.

G Comment of the Technical Committees

Technical Committee 09 - Chemistry (07.03.2018)

Assessment and analysis for the award of the ASIIN seal:

The Technical Committee suggests harmonizing the requirements and recommendations for the female and male cluster procedure at King Saud University. For this reason, two additional recommendations are added, as they apply to both cluster.

Moreover, the former recommendations E1 and E2 are changed into requirements, because the deficit appears to be essential. For the same reason, an additional requirement A5 is issued.

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 Zoology	With requirements for one year	n.a.	30.09.2025
Ba Biochemistry	With requirements for one year	n.a.	30.09.2025
Ba Chemistry	With requirements for one year	n.a.	30.09.2025
Ba Microbiology	With requirements for one year	n.a.	30.09.2025

Technical Committee 10 - Biology (16.03.2018)

Assessment and analysis for the award of the ASIIN seal:

The Technical Committee discusses the procedure and agrees with the modifications proposed by the Technical Committee 09.

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 Zoology	With requirements for one year	n.a.	30.09.2025

Degree Programme	ASIIN seal	Subject-specific labels	Maximum duration of accreditation
Ba Biochemistry	With requirements for one year	n.a.	30.09.2025
Ba Chemistry	With requirements for one year	n.a.	30.09.2025
Ba Microbiology	With requirements for one year	n.a.	30.09.2025

Requirements

For all degree programmes

- A 3. (ASIIN 5.2) Ensure that a Diploma Supplement is given to graduates which 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.
- A 4. (ASIIN 1.1) Ensure, that the educational objectives/learning outcomes of the programmes are published on the website in a way consistent with the programmes' presentation in the department handbooks.
- A 5. (ASIIN 5.1) Ensure that the module descriptions are presented in a way so as to always include concise information about the responsible professor, recommended literature, examination forms and learning outcomes.
- A 6. (ASIIN 2.2; 3) Clearly outline the students' workload for the final project in order to achieve higher international compatibility. Furthermore, a clear identification as an equivalent to the Bachelor's thesis is necessary.
- A 7. (ASIIN 2.2) Ensure that the credits awarded for the modules correspond with the actual workload of the students.

Recommendations

For all degree programmes

- E 1. (ASIIN 1.3) It is recommended to strengthen aspects of soft skills such as English language communication, economy and business leadership, and oral presentation competences in the curricula.
- E 2. (ASIIN 1.3; 1.4) It is recommended to further improve the communication between the departments and other stakeholders (industry) pointing out job opportunities and enhancing practical experiences (via internships or excursions).
- E 3. (ASIIN 2.1) It is recommended to increase the number of bilateral cooperation agreements and to indicate a mobility windows in order to enhance the students' opportunities to study one semester abroad during the Bachelor programmes.
- E 4. (ASIIN 6) It is recommended to ensure that students get an institutionalised feedback about the evaluation results.
- E 5. (ASIIN 1.3) It is strongly recommended to introduce more project-oriented practical (experimental) work into the curriculum.

For the Bachelor's degree programme Chemistry

- E 6. (ASIIN 1.3) It is recommended to strengthen contents of homogenous and heterogeneous catalysis in the curriculum.
- E 7. (ASIIN 1.3) It is recommended to reintroduce the following elective modules on organic and inorganic synthesis as mandatory: Practical Applications of Organic Chemistry, Advanced Practical Organic Chemistry as well as Practical Inorganic Chemistry.

H Decision of the Accreditation Commission (23.03.2018)

Assessment and analysis for the award of the ASIIN seal:

The Accreditation discusses the procedure and agrees to harmonize some of the requirements and recommendations for the female and male cluster procedure. Thus, the new requirements 3, 4 and 5 are being introduced, replacing the previous recommendation 1 and 2. Further, recommendations 5 and 7 are being added from the female Cluster. These measures are considered necessary since both varieties are generally following the same programmes structure.

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

Degree Programme	ASIIN seal	Subject-specific labels	Maximum duration of accreditation
Ba Zoology	With requirements for one year	n.a.	30.09.2025
Ba Biochemistry	With requirements for one year	n.a.	30.09.2025
Ba Chemistry	With requirements for one year	n.a.	30.09.2025
Ba Microbiology	With requirements for one year	n.a.	30.09.2025

Requirements

For all degree programmes

- A 1. (ASIIN 5.2) Ensure that a Diploma Supplement is provided to graduates containing 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.
- A 2. (ASIIN 1.1) Ensure, that the educational objectives/learning outcomes of the programmes are published on the website in a way consistent with the programmes' presentation in the department handbooks.

- A 3. (ASIIN 5.1) Ensure that the module descriptions are presented in a way so as to always include concise information about the responsible professor, recommended literature, examination forms and learning outcomes.
- A 4. (ASIIN 2.2; 3) Clearly outline the students' workload for the final project in order to achieve higher international compatibility. Furthermore, a clear identification as an equivalent to the Bachelor's thesis is necessary.
- A 5. (ASIIN 2.2) Ensure that the credits awarded for the modules correspond with the actual workload of the students.

Recommendations

For all degree programmes

- E 1. (ASIIN 1.3) It is recommended to strengthen aspects of soft skills such as English language communication, economy and business leadership, and oral presentation competences in the curricula.
- E 2. (ASIIN 1.3; 1.4) It is recommended to further improve the communication between the departments and other stakeholders (industry) pointing out job opportunities and enhancing practical experiences (via internships or excursions).
- E 3. (ASIIN 2.1) It is recommended to increase the number of bilateral cooperation agreements and to indicate a mobility windows in order to enhance the students' opportunities to study one semester abroad during the Bachelor programmes.
- E 4. (ASIIN 6) It is recommended to ensure that students get an institutionalised feedback about the evaluation results.
- E 5. (ASIIN 1.3) It is strongly recommended that existing efforts of introducing more project-oriented practical (experimental) work into the curriculum so that it better corresponds to the practical skills and independent research competence needed.

For the Bachelor's degree programme Chemistry

- E 6. (ASIIN 1.3) It is recommended to strengthen contents of homogenous and heterogeneous catalysis in the curriculum.
- E 7. (ASIIN 1.3) It is recommended to reintroduce the following elective modules on organic and inorganic synthesis as mandatory: Practical Applications of Organic Chemistry, Advanced Practical Organic Chemistry as well as Practical Inorganic Chemistry.

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 degree programme Biochemistry:

PROGRAM-SPECIFIC LEARNING OUTCOMES

Knowledge

1. Describe the basics of biochemistry from the perspectives of cellular, enzymatic and nutritional aspects.
2. Explain molecular biology and its implications in cell activity and disease.
3. Summarize the biophysical fundamentals of the biochemical processes.
4. Recognize the principles of biochemistry in clinical applications.

Cognitive

1. Carry out biochemical experiments and analytical analysis to address scientific problems.
2. Analyze cellular and genetics functions to solve biochemical research problems.
3. Detect chemical and physical principles in biological systems and validate their applications in practical life.
4. Design experimental work in biomedical research laboratories.

Interpersonal Skills and Responsibility

1. Describe and apply ethical principles involved in conducting research in clinical and basic biochemistry, including issues pertaining to human subjects and animal care and use, and defend the significance and application of these principles to research problems.
2. Plan responsibility for their own learning and continuing personal and professional development,
3. Work effectively in teams and exercise leadership when appropriate.

Communication, Information Technology and Numerical Skills

1. Demonstrate the ability to search the internet for literature and information in particular areas of biochemistry.
2. Read and critique scientific articles, demonstrate scientific writing skills, and deliver oral presentations.
3. Evaluate biochemical calculations in experiments and data analysis.

Psychomotor Skills (if applicable)

1. Not applicable.

Biochemistry Program Learning Outcomes:

ILO#	Description
ILO-1	Discuss and explain the chemical principles of biological catalysis, thermodynamic, and bioenergetics of biological activity.
ILO-2	Describe the essential features of cell metabolism and its control
ILO-3	Explain the principles that determine the structure of biological macromolecules, and how structure enables function
ILO-4	Acquire a critical understanding of the molecular processes of the cell and relevant experimental methods
ILO-5	Apply and recognize clinical features of biochemistry including the immune system, hormonal regulation, and biomarkers of health and diseases
ILO-6	Use and attain competence in experimental methods of biochemistry and molecular biology
ILO-7	Extract proper and relevant information related to any area of Biochemistry including genomics, proteomics, and bioinformatics.

Appendix: Programme Learning Outcomes and Curricula

ILO-8	Prepare process, interpret, and present data, using appropriate qualitative and quantitative techniques.
ILO-9	Analyze and summarize information critically, including published research
ILO-10	Employ critical thinking in the performance, design, interpretation and documentation of laboratory experiments.
ILO-11	Understand theoretical concepts of instruments that are commonly used in biochemistry fields.
ILO-12	Conduct biochemical research independently and in collaboration with others.
ILO-13	Communicate, deliver oral presentation
ILO-14	Understand professional and scientific ethics

The following **curriculum** is presented:

Compulsory Courses				
Semester (provider)	Course Code	Course Name	Pre-requisite	Credit Hours
First	MATH140	Introductory Mathematics	None	2
	ENG140	English Language (1)	None	8

Appendix: Programme Learning Outcomes and Curricula

(preparatory)	CUR140	Learning, Thinking and Research Skills	None	3
	CHS150	Health and Fitness (2)	None	1
		Total		14
Second (preparatory)	ENT101	Entrepreneurship	None	1
	CT140	Computer skills	None	3
	MC140	Communication Skills	None	2
	MATH150	Calculus	MATH140	3
	ENG150	English Language (2)	ENG140	8
		Total		17
Third (BSc BCH program)	Chem101	General Chemistry (1)	None	4
	Zoo103	Principles of general Zoology	None	3
	Stat106	Biostatistics	None	2
	MIC140	Microbiology	None	3
		Total		12
Fourth (BSc BCH program)	Phys102	General Physics (2)	None	4
	Chem108	Introduction in Organic Chemistry	None	4
	BCH201	General Biochemistry (1)	None	3
	Chem231	Chemical Thermodynamic	None	2
		Total		13
Fifth (BSc BCH program)	Chem251	Analytical Chemistry	None	3
	BCH302	General Biochemistry (2)	BCH201	4
	BCH312	Biochemical Calculations	BCH201	3
	BCH320	Enzymes	BCH201	3

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	BCH322	Experiments in Enzymology	BCH201	2
	Chem341	Heterocyclic Organic Chemistry	Chem108	2
		Total		17
Sixth (BSc BCH program)	BCH332	Biophysical Biochemistry	BCH302	3
	BCH333	Experiments in Biophysical Biochemistry	BCH302	2
	BCH340	Metabolism (1)	BCH320	3
	BCH361	Molecular Biology	BCH302	4
	BCH471	Biochemistry of Blood	BCH302	3
		Total		15
Seventh (BSc BCH program)	BCH440	Metabolism (2)	BCH340	3
	BCH447	Practical Metabolism	BCH340	2
	BCH452	Biomembranes and Cell Signaling	BCH302	2
	BCH462	Biotechnology & Genetic engineering	BCH361	4
	BCH485	Training in the Principles and Scientific Research skills	BCH340 BCH361	2
		Total		13
Eighth (BSc BCH program)	BCH445	Nutritional Biochemistry	BCH302	3
	BCH453	Hormones	BCH340	2
	BCH463	Bioinformatics	BCH361	3
	BCH477	Immunology	BCH440	2
	BCH497	Research and Seminar	BCH333 BCH340 BCH485	3
		Total		13

List of electives:

Appendix: Programme Learning Outcomes and Curricula

Group	Course Code	Course Name	Pre-requisite	Credit Hours
GI	SLM100	Studies in Prophet Seerah	None	2
	SLM101	Fundamentals of Islamic Culture	None	2
	SLM102	Family in Islam	None	2
	SLM103	Islamic economy	None	2
	SLM104	Islamic politics	None	2
	SLM105	Human Rights	None	2
	SLM106	Medical Jurisprudence	None	2
	SLM107	Ethics	None	2
	SLM108	Current topics	None	2
	SLM109	Women & her role in Improvement	None	2
GII	ZOO352	Principles of Genetics	ZOO342	2
	MIC450	Medical Virology	MIC250	3
	MIC460	Medical Bacteriology	MIC260	3
GIII	BCH102	Cellular Biochemistry	None	2
	BCH434	Biophysics	BCH340	2
	BCH441	Bioenergetics	BCH320	2

	BCH450	Biochemistry of Specialized Tissues	BCH340	2
	BCH472	Biochemistry of Biological Fluids	BCH320	3
	BCH473	Biomarkers in Health & Diseases	BCH320	3
	BCH436	Nanotechnology	BCH361 BCH440	2
	BCH454	Toxicology & Carcinogens	BCH440 BCH462	2
	BCH464	Gene Expression	BCH361 BCH440	2
	BCH465	Biochemical Genetics	BCH361 BCH440	2
	BCH466	Molecular Biology of Cancer	BCH440 BCH462	2

According to the self-assessment report the following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved by the Bachelor degree programme Microbiology:

(i) Summary description of the knowledge to be acquired

- Lab skills (Chemical, Clinical and biological Labs)
- Research, Presentation and communication skills

- Principles of Microbiological Sciences (Taxonomy, Physiology, Pathology, Genetics, etc.
- Role of microorganisms in life and their relations with other organisms
- How to detect and treat with diseases caused by Microorganisms
- Role in Microorganisms in Medicine, Economy, Nutrition, Scientific development and different other sides of life
- The basics of biotechnology used for the diagnosis of the molecular and cellular disease
- Principle of the basic science (Mathematics, statistics, organic, inorganic and analytical chemistry, biochemistry and physics
- Some basic of the Islamic studies and foreign languages
- Data statistical analysis and scientific essay writing skills

(i) Cognitive skills to be developed and level of performance expected

- Skills to collect scientific results and data drafting and presentation
- The skills of the data statistical analysis
- Skills of scientific research and writing of report and scientific paper
- Foreign language skills
- Communication skills
- Skills to deal with laboratory samples of the various science and learn how to be analyzed and study
- Skills of fine technology related to the study of plant science and related sciences
- The skill of self-learning

The skill of the lecture preparation and presentation

The following **curriculum** is presented:

1 st Semester					
Course Code	Course Title	Pre- Req.	Co- Req.	Credits (Lect.- Exre.- Pract.)	
CI 140	Learning, Thinking and Research Skills	-	-	3 (3+0+0)	
CHS 150	Health and Fitness (2)	-	-	1 (1+0+0)	
ENG 140	English Language (1) (E)	-	-	8 (8+0+0)	
MATH 140	Introduction to Mathematics (E)	-	-	2 (1+1+0)	
Total of Credit Hours				14	

Appendix: Programme Learning Outcomes and Curricula

2 nd Semester				
Course Code	Course Title	Pre- Req.	Co- Req.	Credits (Lect.- Exe.- Pract.)
CT 140	Computer Skills (E)	-	-	3 (0+0+3)
MC 140	Communication Skills	-	-	2 (2+0+0)
ENG 150	English Language (2) (E)	ENG 140	-	8 (8+0+0)
MATH 150	Differential Calculus (E)	140 MATH	-	3 (2+1+0)
ENT 101	Entrepreneurship	-	-	1 (1+0+0)
Total of Credit Hours				17

3 rd Semester				
Course Code	Course Title	Pre- Req.	Co- Req.	Credits
CHEM 101	General Chemistry (1)	-	-	4(3+0+1)
BCH 101	General Biochemistry	-	-	4 (3+0+1)
MBIO. 140	General Microbiology	-	-	3 (2+0+1)
STAT 106	Biostatistics	-	-	2 (1+1+0)
Elective course from University requirement			-	2 (2+0+0)
Total of Credit Hours				15

4 th Semester				
Course Code	Course Title	Pre- Req.	Co- Req.	Credits
MBIO 240	Laboratory Skill	MBIO 140	-	2 (0+0+2)
MBIO 250	General Virology		-	3 (2+0+1)
MBIO 260	General Bacteriology		-	3 (2+0+1)
MBIO 270	General Mycology		-	3 (2+0+1)
Free course			-	2
Elective course from University requirement			-	2 (2+0+0)
Total of Credit Hours				16

5 th Semester				
Course Code	Course Title	Pre- Req.	Co- Req.	Credits
MBIO 280	Biology of Microalgae	MBIO140	-	2 (1+0+1)
FSN 321	Food Microbiology	MBIO (260, 270)	-	3 (2+0+1)
MBIO 330	Microbial Physiology	MBIO (240, 250, 260, 270)	-	3 (2+0+1)
MBIO 340	Microbial Ecology & Pollution	MBIO (250, 260,	-	3 (2+0+1)
Elective course from Outside Specialization		Variable	-	3
Elective course from University requirement			-	2 (2+0+0)
Total of Credit Hours				

6 th Semester				
Course Code	Course Title	Pre- Req.	Co- Req.	Credits

Appendix: Programme Learning Outcomes and Curricula

MBIO 320	Microbial Diagnosis	MBIO (240, 250,	-	2 (1+0+1)
MBIO 334	Biochemical Instrumentation Techniques	MBIO (250, 260,	-	2 (1+0+1)
MBIO 344	Sanitation and Water Microbiology	MBIO 340	-	2 (1+0+1)
MBIO 351	Microbial Genetics	MBIO (250, 260,	-	3 (2+0+1)
MBIO 362	Microbial fine structure	MBIO (250, 260,	-	2 (1+0+1)
MBIO 465	Industrial microbiology	FSN 321,	-	2 (1+0+1)
Elective course from Outside Specialization		Variable	-	2
Elective course from University requirement			-	2 (2+0+0)
Total of Credit Hours				

7 th Semester				
Course Code	Course Title	Pre- Req.	Co- Req.	Credits
MBIO 466	Introduction to Petroleum Microbiology	MBIO (340, 344)	-	2 (1+0+1)
MBIO 451	Immunology	MBIO 351	-	3 (2+0+1)
MBIO 450	Medical Virology	MBIO 250	-	3 (2+0+1)
MBIO 460	Medical Bacteriology	MBIO 260	-	3 (2+0+1)
MBIO 470	Medical Mycology	MBIO 270	-	3 (2+0+1)
MBIO 490	Scientific Communication	After 6 th Semester		1 (1+0+0)
MBIO 499	Research Project	MBIO (450, 460,	MBIO 490	3 (0+0+3)
Total of Credit Hours				18

8 th Semester				
Course Code	Course Title	Pre- Req.	Co- Req.	Credits
MBIO 493	Training in medical microbiology laboratories	MBIO (450, 470,	None	6 (0+0+6)
Six				
Elective courses from Specialization		MBIO 140	-	12
Total of Credit Hours				18

According to the website report the following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved by the Bachelor degree programme Chemistry (Accessed 18 December 2018: <https://sciences.ksu.edu.sa/en/node/829>):

Skills and Capabilities of BSc. in Chemistry graduate:

- Has the knowledge of concepts and basic theories of chemistry.

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- Recognize methods of safety in chemicals laboratories and has the ability to assess the hazards of chemicals.
- Has sufficient skill to conduct chemical reactions to prepare and identify chemicals using modern equipment's and study their properties.
- Can interpret results by linking chemical and physical concepts with mathematical expressions using computer software and the internet.
- Can prepare and present practical results of scientific research clearly to the public and answer questions in a scientific manner.
- Apply the necessary skills for continuing learning and professional development taking the advantage of developments in the field of chemistry.
- Have awareness of sustainable development and the role of chemistry in minimizing negative impacts on the environment.
- Practical scientific and creative thinking in the search for solutions to some industrial and environmental problems in society.
- Has open mind and being objective, respect the others' point of view, and ethics of scientific research.
- Have the initiative and the ability to manage time, effective planning, and take appropriate decisions in the field of work.
- Has the ability to continue his postgraduate studies in the fields of chemistry.

The following **curriculum** is presented:

First Level				Second Level			
Course	Name	Prereq.	Units	Course	Name	Prereq.	Units
ENG 140	English (1)	None	8	TEC 140	Computer skills	None	3
MATH 140	Mathematics (1)	None	2	MATH 150	Mathematics (2)	MATH 140	3
NHG 140	Research, learning skills	None	3	ENG 150	English (2)	ENG 140	8
HEL 150	Health & Fitness	None	1	SCI 150	Communication skills	None	2
				ENT 101	Entrepreneurship	None	1
Total			14	Total			17
Third Level				Fourth Level			

Appendix: Programme Learning Outcomes and Curricula

Course	Name	Prereq.	Units	Course	Name	Prereq.	Units
CHEM 101	General Chemistry (1)	None	4 (3+1)	CHEM 222	CHEM. of Main Groups	CHEM 101	3 (3+0)
CHEM 107	General Chemistry (2)	None	3 (3+0)	CHEM 231	Chemical thermodynamics	CHEM 101	2 (2+0)
MATH 111	Integration Calculus	Math 150	4 (3+1)	CHEM 240	Organic Chemistry (1)	CHEM 101	2 (2+0)
PHYS 102	General Physics (2)	None	4 (3+1)	CHEM 247	Iden. of Org. Comp.	CHEM 107	2 (0+2)
	University requirement (Elective course)	None	2 (2+0)	CHEM 250	Vol. and Grav. Ana.	CHEM 107	4 (3+1)
					University requirement (Elective course)	None	2 (2+0)
					Elective Course		3
Total			17	Total			18
	Fifth Level				Sixth Level		
Course	Name	Prereq.	Units	Course	Name	Prereq.	Units
	University requirement	None	2 (2+0)		University requirement	None	2 (2+0)
CHEM 321	CHEM. of Transition Elements	CHEM 222	2 (2+0)	CHEM 322	Quantum Chemistry (1)	CHEM 107 + Math 111	2 (2+0)
CHEM 331	Phases of Substances and Solutions	CHEM 231	2 (2+0)	CHEM 328	Inorganic Compounds Spectroscopy	CHEM 321	2 (2+0)
CHEM 337	Practical Physical Chemistry (1)	CHEM 231	2 (0+2)	CHEM 332	Chemical Kinetics	CHEM 231	2 (2+0)
CHEM 340	Organic Chemistry (2)	CHEM 240	2 (2+0)	CHEM 341	Heterocyclic Organic Chemistry.	CHEM 340	2 (2+0)
CHEM 351	Spectroscopic Methods	CHEM 250	2 (1+1)	CHEM 342	Polymers and Petrochemicals.	CHEM 340	2 (2+0)
	CHEM. Elective Course		2	CHEM 352	Electo-analytical Methods	CHEM 250	2 (1+1)
	CHEM. Elective Course		2		CHEM. Elective Course		2

Appendix: Programme Learning Outcomes and Curricula

Free Elective Course		2		Free Elective Course		2	
Total				18			
Total				18			
Seventh Level				Eighth Level			
Course	Name	Prereq.	Units	Course	Name	Prereq.	Units
CHEM 422	Chemistry of Solid State	CHEM 321	3 (2+1)	CHEM 424	Organometallic Chemistry	CHEM 321	2 (2+0)
CHEM 435	Chemistry of Interfacial Surfaces	CHEM 231	2 (2+0)	CHEM 451	Chemical Separation and Chromatographic Methods	CHEM 351	2 (1+1)
CHEM 438	Practical Physical Chemistry (2)	CHEM 331	2 (0+2)	CHEM 499	Research Project		3 (0+3)
CHEM 441	Organic Compounds Spectroscopy	CHEM 341	2 (2+0)		CHEM. Elective Course		2
CHEM 497	Training on Chemical Instrument	CHEM 351	2		CHEM. Elective Course		2
	CHEM. Elective Course		2		CHEM. Elective Course		2
	CHEM. Elective Course		2		Elective Course		3
	Free Elective Course		2		Free Elective Course		1
Total				17			
Total				17			

According to self-assessment report the following **objectives and learning outcomes (intended qualifications profile)** shall be achieved by the Bachelor degree programme Zoology:

	NQF Learning Domains and	Teaching Strate-	Assess-ment
1.0	Knowledge		
1.1	Possess a good command of fundamentals in Zoology and its relationship to other disci-	Lectures, sup- port readings	Written exams
1.2	Know the theories and scientific facts in the sections of Zoology and interrelations among organisms and their biosphere.	Support readings	Practical exams
1.3	Define laboratory bio-techniques and applica- tions.	group discussions	Evaluating individ- ual and group tasks

Appendix: Programme Learning Outcomes and Curricula

1.4	Memorize the concepts of laboratory management, organization and evaluation.	writing reports - preparing research papers	Evaluating presentations and talks.
1.5	Recognize the management and concepts of bio- systems, organization and evaluation.	Conducting individual tasks - practical training	
1.6	Outline the policy and legislation of animal Science and ethics.	field training – Talks	
2.0	Cognitive Skills		
2.1	Design and conduct experiments in Zoology, Analyze data, interpret results, and write Biological reports.	Testing and training process	Assessment of scientific experiments
2.2	Communicate effectively through writing reports, giving presentations, and participating in discussions,	field studies - a group discussion	evaluating individual and group tasks
2.3	Develop life-long learning skills and a Zoological	- how to resolve	Written exams

	approach to research related problems in Zoology and related fields	the problem	
2.4	Design projects in Zoology	Individual and group	
3.0	Interpersonal Skills and Responsibility		
3.1	Students will be able to work constructively in groups	Working in groups	Direct observation
3.2	Acting as coordinator between members of the team	Attend workshops and semi-	Periodic reports on student
3.3	Ability to communicate effectively	Self-learning	Independent evaluation
3.4	Recognition of the need for, and an ability to engage in, life-long learning	Performing field trips for specimen collection	Assessment of group projects
4.0	Communication, Information Technology, Numerical		
4.1	Communicate effectively with other members of the team.	Lectures	Theoretical and practical tests
4.2	Demonstrate communication skills such as : writing, reading, presenting, negotiating and debating	Writing report, presenting task	Evaluation reports, presentations and tasks
4.3	Demonstrate skill in the usage of computers, networks, and software packages relevant to Zoology	Preparation and searching tasks	Activities
4.4	Learn the principles of biostatistics	Analyzing data	
5.0	Psychomotor (if applicable)		
	None	None	None

Appendix: Programme Learning Outcomes and Curricula

The following **curriculum** is presented:

Preparatory year 1 st Semester				
Course code		Name	Prereq.	Units
ENG	140	English (1)	None	8 (8+0)
MAT	140	Mathematics (1) (Introduction)	None	2 (1+1)
CI	140	Research, thinking and learning skills	None	3 (3+0)
CHS	140	Health & Fitness	None	2 (2+0)
Total				15

Preparatory year 2 nd Semester				
Course code		Name	Prereq.	Units
ENG	150	English (2)	140 ENG	8 (8+0)
MAT	150	Mathematics (2) (Calculus)	140 MAT	3 (2+1)
CT	140	Computer skills	None	3 (3+0)
MC	150	Communication skills	None	2 (2+0)
Total				16

Third level				
Course code		Name	Prereq.	Units
IC	...	University Requirement	None	2 (2+0)
IC	...	University Requirement	None	2 (2+0)
Chm	103	General chemistry-1	None	3 (3+0)
Geo	105	Geology	None	2 (2+0)
Sts	106	Biostatistics	None	2 (1+1)
Bot	102	General botany	None	3 (2+1)
Zoo	103	Principles of General Zoology	None	3 (2+1)
Total				17

Fourth level				
Course code		Name	Prereq.	Units
IC	...	University Requirement	None	2 (2+0)
Bch	101	General biochemistry	None	4 (3+1)
Phys	205	Biophysics	None	2 (2+0)
Mic	140	Microbiology	None	3 (2+1)
Zoo	212	Parasitology	Zoo 103	3 (2+1)
Zoo	242	Cell biology & Physiology	Zoo 103	3 (2+1)
Total				17

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Fifth level				
Course code		Name	Prereq.	Units
Zoo	245	Histology	Zoo 242	2 (1+1)
Zoo	262	Microtechniques	Zoo 103	2 (1+1)
Zoo	305	Animal modern Taxonomy	Zoo 103	2 (1+1)
Zoo	320	Ichthyology	Zoo 103	2 (1+1)
Zoo	327	Herpetology	Zoo 103	3 (2+1)
Zoo	332	General physiology	Zoo 103	3 (2+1)
Zoo	373	Terrestrial ecology	Zoo 103	2 (1+1)
Total				16

Sixth level				
Course code		Name	Prereq.	Units
IC	...	University Requirement	None	2 (2+0)
Zoo	311	General Entomology	Zoo 103	3 (2+1)
Zoo	325	Ornithology	Zoo 103	2 (1+1)
Zoo	326	Mammology	Zoo 103	2 (1+1)
Zoo	342	Molecular biology	Zoo 242	2 (1+1)
Zoo	374	Aquatic ecology	Zoo 103	2 (1+1)
		Elective courses	-	(4)
Total				17

Seventh level				
Course code		Name	Prereq.	Units
Zoo	317	Medical arthropods	Zoo 311	3 (2+1)
Zoo	352	Principles of genetics	Zoo 342	2 (1+1)
Zoo	375	Pollution	Zoo 103	2 (1+1)
Zoo	420	Comparative vertebrate anatomy	Zoo 103	2 (1+1)
Zoo	423	Principles of descriptive embryology	Zoo 103	2 (1+1)
Zoo	432	Endocrinology	Zoo 332	2 (1+1)
		Elective courses	-	(4)
Total				17

Eighth level				
Course code		Name	Prereq.	Units
Zoo	424	Principles of experimental embryology	Zoo 423	2 (1+1)
Zoo	425	Economic fishes and crustaceans	Zoo 320	2 (1+1)
Zoo	433	Immunology	Zoo 332	2 (1+1)
Zoo	461	Laboratory technology	Zoo 262	2 (0+2)
Zoo	471	Animal behavior	Zoo 103	2 (1+1)
Zoo	498	Graduation research project	*	2 (0+2)

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		Elective courses	-	(4)
Total				16