ASIIN Seal

Accreditation Report

Bachelor's Degree Programme
Biotechnology and Genetic Engineering

Provided by
Jordan University of Science and Technology

Version: 28 June 2024

Table of Content

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]
تقانات حيوية و هندسة وراثية	Bachleor's programme Biotechnology and Genetic Engineering	ASIIN	ASIIN until 30.09.2024	10, 14
Date of the contract: 16.04.2023 **Submission of the final version of the self-assessment report:** 10.01.2024 **Date of the audit:** 05.03. – 07.03.2024 **at: Irbid, Jordan**				
Expert panel: Prof. Dr. Hans-Jörg Jacobsen, University Hannover Prof. Dr. Joachim Fensterle, University of Applied Sciences Rhein-Waal Prof. Dr. Abdo Mahli, German Jordanian University Duha Hamed, German Jordanian University, student				
Representative of the ASIIN headquarter: Rainer Arnold				
Responsible decision-making committee: Accreditation Commission for Degree Programmes				
Criteria used: European Standards and Guidelines as of 15.05.2015				

[1] ASIIN Seal for degree programmes;
[2] TC: Technical Committee for the following subject areas: TC 10 – Life Sciences, TC 14 - Medicine

ASIIN General Criteria as of 28.03.2023 Subject-Specific Criteria of Technical Committee 10 – Life Sciences as of 28.06.2019	

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's programme Biotechnology and Genetic Engineering	Bachelor of Science	-	6	full time,	no	8 Semester	132 Jordan Credit Points, 240 ECTS	Fall + Spring Semester, 2000

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

For the Bachelor's degree programme Biotechnology and Genetic Engineering, Jordan University of Science and Technology (JUSU) has presented the following vision and mission:

„The Biotechnology & Genetic Engineering program brings a unique combination of skills and wide range of scientific disciplines together to maximize the benefit of both teaching and research programs. The research interests of the department staff spans a broad range including Microbiology, Biochemistry, Genetics, Plant Biotechnology, Molecular Biology, Immunology, Haematology and Animal Biotechnology.

Vision

Our vision is to be a Center of Excellence in the field of biotechnology in Jordan and the region.

Mission

Our mission is to develop a leading biotechnology teaching and research department in order to produce competent biotechnologists and researchers through quality education to provide the needs and challenges of the country and the region."

C Expert 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:

- Objectives-Module-Matrix
- Self-Assessment Report
- Study plan
- Module descriptions
- Webpage JUST: https://www.just.edu.jo/Pages/Default.aspx
- Webpage Faculty of Science and Arts: https://www.just.edu.jo/FacultiesandDepartments/FacultyofScienceandArts/Departments/BiotechnologyandGeneticEngineering/Pages/Biotechnology%20and%20Genetic%20Eng.aspx
- Webpage Ba Genetic Engineering and Biotechnology: https://www.just.edu.jo/facultiesanddepartments/FacultyofScienceandArts/Pages/viewplan.aspx?planno=623
- Discussions during the audit

Preliminary assessment and analysis of the experts:

The experts 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 programme Biotechnology and Genetic Engineering as defined by JUST correspond with the competences as outlined by the SSC. As a result, they come to the following conclusions:

Graduates of the Bachelor's degree programme Biotechnology and Genetic Engineering should understand the fundamental biological process and be capable of applying the scientific and technological methods of the biological and biotechnical sciences. In addition, graduates should acquire relevant scientific knowledge in the different biological areas such as cell biology, biochemistry, genetics, molecular biology, microbiology, and immunol-

ogy as well as in related sciences (chemistry, physics, and mathematics). Furthermore, students learn about the molecular basis of modern genetics, like structure and function of DNA and RNA, gene expression and regulation, and protein synthesis. Moreover, students should acquire the ability to work practically in a laboratory and to apply biological lab equipment and methods as well as be able of utilising and applying their knowledge of biotechnology in various areas such as medicine, nutrition, pharmaceuticals, agriculture, and other related fields.

Furthermore, graduates should be able to solve subject-relevant problems and present the results, have trained their analytical and logical abilities, and be aware of possible social, ethical, and environmental effects of their actions. During their studies, students have also acquired the necessary social competences, such as the ability to work in a team, present and discuss results, and communicate with other experts.

The programme educational objectives and learning outcomes are expected to equip the graduates with life skills required to develop and adapt to the broad spectrum of possible occupations. Graduates have the opportunity to find employment in a various fields including teaching, clinical genetics, bioinformatics, pharmaceutical and biotechnology companies, diagnostic laboratories, and research institutes. As the experts learn during the audit, several graduates work in In-Vitro-Fertilisation (IVF) lab, or become teachers or sales representatives. Students(graduates are also supported in applying at the Ministry of Health for the certificates, which are required in order to be able to work in hospitals and other clinical institutions, which is one of the most important areas of occupation. About 15 to 20 % of the graduates continue with a Master's programme either at JUST or at other universities.

In summary, the experts are convinced that the intended qualification profile of the Bachelor's degree programme Biotechnology and Genetic allows graduates to take up an appropriate occupation. The experts conclude that the objectives and intended learning outcomes of the degree programme adequately reflect the intended level of academic qualification (EQF 6) and correspond sufficiently with the ASIIN Subject-Specific-Criteria (SSC) of the Technical Committee 10 – Life Sciences.

Criterion 1.2 Name of the degree programme

Evidence:

- Self-Assessment Report

Preliminary assessment and analysis of the experts:
The experts confirm that the English translation and the original Jordanian name of the Bachelor's degree programme Biotechnology and Genetic Engineering correspond with the intended aims and learning outcomes as well as the main course language (English).

Criterion 1.3 Curriculum

Evidence:

- Self-Assessment Report
- Study plan
- Module descriptions
- Webpage JUST: https://www.just.edu.jo/Pages/Default.aspx
- Webpage Faculty of Science and Arts: https://www.just.edu.jo/FacultiesandDepartments/FacultyofScienceandArts/Departments/BiotechnologyandGeneticEngineering/Pages/Biotechnology%20and%20Genetic%20Eng.aspx
- Webpage Ba Genetic Engineering and Biotechnology: https://www.just.edu.jo/facultiesanddepartments/FacultyofScienceandArts/Pages/viewplan.aspx?planno=623
- Discussions during the audit

Preliminary assessment and analysis of the experts:
The Bachelor's degree programme Biotechnology and Genetic Engineering is offered by the Department of Biotechnology and Genetic Engineering, which is part of the Faculty of Sciences and Arts of JUST.

The programme is designed for four years and at least 132 Jordanian credit hours need to be achieved by the students (this is equivalent to 240 ECTS points). As described in the Self-Assessment Report, most of the courses (both compulsory and electives) are offered every semester. The academic year comprises two semesters of (16) weeks each and exams periods. In addition to the regular semester, every summer several courses are offered upon the request of the students. The short summer semester is designed for students who have missed or failed some classes. The summer semester lasts for eight weeks and students can only register for up to 12 credit hours.

Each course has a specific weight (credit hours) ranging from one (mainly laboratories) to three (full course). The course weight represents the actual teaching time per week and does not include the self-study, homework or any other outside class-room activities. To obtain the degree, students are required to complete 132 credit hours. These are grouped

in different categories: University Requirements (16 hours), University Electives (9 hours), Faculty Requirements (19 hours), Department Requirements (78 hours), and Department Electives (10 hours). The details are shown in table 1:

	Compulsory		**Elective**		**Total**	
University	16 ch	29 ECTS	9 ch	16 ECTS	25 ch	45 ECTS
College of Science	19 ch	35 ECTS	-	-	19 ch	35 ECTS
Department	78 ch	142 ECTS	10 ch	18 ECTS	88 ch	160 ECTS
Total	113 ch	216 ECTS	19 ch	24 ECTS	132 ch	240 ECTS

Table 1: Credit hours per area, Source: SAR JUST

The courses in the first two semesters convey basic knowledge of biology, chemistry, mathematics, physics, and languages (Arabic and English). In the third and fourth semesters, the focus is on courses in physics, cell biology, biotechnology, biostatistics, organic and analytical chemistry, and C++. Courses on the specific biological sciences such as biochemistry, microbiology, molecular biology, genetics, bioinformatics, tissue culture, plant biotechnology, animal biotechnology, and immunology are offered from the fifth to the eighth semester. In addition, students, starting with the fifth semester, can choose different electives, which total 19 credit hours.

Part of the curriculum is the compulsory course “Field Training” which is designed as an internship at a company or research institution. The minimum duration of the internship is eight weeks (210 hours). The internship is usually conducted in hospitals, forensic and research labs, food industries, and environmental institutions. A faculty member is assigned to the students and visits them during the field training.

In the last year of studies, all students have to complete the “research project” (Bachelor’s thesis). The course is designed to provide students with direct research experience including aspects of literature search, planning and designing experiments, data collection, analysis, and interpretation. Students will also gain experience in scientific communication by submitting a written final report and defend the results of their research in front of a faculty committee. Introducing a compulsory final project was a major change in the curriculum that was implemented as a result of the last audit.

During the audit, the experts discuss in detail with programme coordinators, faculty members, students, and employers if it would be useful to offer different areas of specialisation in the Biotechnology and Genetic Engineering programme. If students can specialize in various areas this would increase their career prospects and opportunities. This point of view

is supported by all stakeholders. Useful areas of specializations include Cellular and Molecular Biotechnology, Industrial Biotechnology, Food Biotechnology, Plant Biotechnology, and Medical/Pharmaceutical Biotechnology. Offering different specialisations would allow students to follow their personal areas of interest and provide them with specific skills and knowledge that are required by specific industries and career paths within the broad field of biotechnology. Students could choose a specialization based on their interests, career goals, and the impact they wish to make in areas such as medicine, agriculture, energy, environment, or food production. If some areas of specialisation, e.g. industrial biotechnology are not covered by the faculty members, JUST should hire teachers with the respective academic qualification.

Despite the quite comprehensive portfolio on general biotechnology and genetic engineering, the area “Plant Biotechnology” seems to be somewhat undernourished and requires substantial enhancement. Students, who want to gain a major in this field, which is of prime priority for Jordan, need hands-on experience in plant tissue culture, vector construction etc. for both enabling the development of primary transgenics as well as paving the grounds for genome editing. Both technologies will be key for adapting regional crops to withstand climate change challenges in due times. The experts also strongly recommend to cooperate more closely with the Faculty of Agriculture in order to connect the Biotechnology and Genetic Engineering programme with the areas of plant breeding and variety development.

Another aspect, which is discussed with the students is the scope of education in chemistry and physics. The students emphasise that from their point of view two compulsory courses in chemistry (CHEM 101 and CHEM 102) and two courses in physics (PHY 101 and PHYS 102) are too much. They suggest to having just one course in general chemistry and one in general physics as offered in other study programmes. This suggestion is supported by the experts and the Department of Biotechnology and Genetics should take it into consideration.

With respect to practical courses, the experts are convinced that students should get hands-on experience with fermentation technologies and bioreactors. Currently, students learn the theoretical background of bioprocess engineering and formation technologies, but these topics are not included in the laboratory courses. As bioprocess engineering and fermentation play a vital role in putting biotechnology into practice by designing the necessary equipment and processes for producing essential products like medicines and therapeutics, as well as the controlled growth of microorganisms to produce antibiotics, vaccines, and biofuels, students should also be familiar with the respective devices and get hands-on experience with them.

During the audit, the employers point out that genetic counsellors are highly in demand in Jordan for supporting and advising couples with family planning. Genetic counsellors interpret and explain genetic information to patients and to support them and their families. The Department of Biotechnology and Genetic Engineering should support students in achieving the required certificates so that they can work as genetic counsellors after graduation.

Finally, the experts emphasise that especially in fast developing scientific topics such as biotechnology and genetic engineering it is very important that the Department keep track of new developments and teaches students new methods such as CRISPR/Cas. The programme coordinators explain that CRISPR/Cas is taught in the course "Microbial Biotechnology" (BT 431), however, the respective module description does not include this information. To this end, the Department of Biotechnology and Genetic Engineering needs to update the module description according to the currently taught content and to include state of the art literature references. To achieve this goal, the budget for purchasing current scientific literature needs to be increased. Biotechnology is a rapidly changing area with new developments every year, so students and teachers need to be informed about new discoveries and need to have access to current scientific publications (see also criterion 4.1).

The information about the curriculum and the respective module descriptions are available on the programme's webpage.

International Mobility

JUST provides some opportunities for students to participate in international exchange programmes. Students who take part in student exchanges through cooperation programmes can gain recognition of the acquired credits after obtaining approval from the Head of Department. The credits acquired abroad are transferable to JUST, although this transfer of credits is only possible, if the course's content matches to 70% a similar course at JUST. The Experts accept this regulation.

The International Relation Office of JUST is responsible for managing and coordinating the international activities such as coordinating and managing student mobility programmes, developing and maintaining relationships with partner institutions and organisations around the world, recruiting and admitting international students, providing support and assistance to international students during their time at UJUST, such as helping with housing, visa issues, and other practical matters.

The number of Biotechnology students, who spend some time abroad is still low despite students' high interest. For example, since 2019/20 ten students visited different international universities. Five students went to Italy, three to Turkey and two to the Czech Republic. These students went abroad in the ERASMUS+ framework, a similar number of students applied directly to international universities and studied there for a semester.

The students confirm during the discussion with the experts that some opportunities for international academic mobility exist and that the credits acquired abroad can be recognised at JUST. However, they also point out that they wish for more places and scholarships for long- and short-term stays abroad. The number of available places in the mobility programmes is still limited and there are restrictions due to a lack of sufficient financial support and personal circumstances. The experts recommend increasing the efforts to further internationalising the programme by offering more places in international exchange programmes especially for Biotechnology and Genetic Engineering students.

The experts emphasize that it is very useful for students to spend some time abroad already during their Bachelor's studies to improve their English proficiency, to get to know other educational systems, and to enhance their job opportunities.

A good starting point for initiating more international cooperations are the personal international contacts of the faculty members and the guest lecturers. It is also possible for students and teachers to apply to international organisations like ERASMUS or the German Academic Exchange Council (DAAD) for receiving funds for stays abroad.

In summary, the experts appreciate the effort to foster international mobility and support the Faculty of Nursing to further pursuing this path. However, with respect to academic mobility there is still room for improvement.

Criterion 1.4 Admission requirements

Evidence:

- Self-Assessment Report
- General Regulations for awarding the Bachelor's Degree of the Jordan University of Science and Technology
- Discussions during the audit

Preliminary assessment and analysis of the experts:

Admission to JUST mostly depends on the grades of the high school graduates. They must pass the Jordanian High School Diploma (Tawjihi) with a minimum grade of 65% in the scientific classes. All Jordanian high school graduates that want to study at a university must

fill out an application form with 20 options based on their preferences in different subjects and universities. Applicants are ranked based on their high school grades and the best get their first choice.

In addition, some students are accepted based on the profession of their parents. For instance, students whose parents are working at JUST would compete with students from the same group for an assigned number of placements. Finally, 5% of the available placements are reserved for Jordanian students who obtained their high school diploma abroad.

All new students at JUST have to take an English and computer science test. If students pass, they just have to take one English language and computer science course, if the fail they have to take a second English language and computer science course

According to the provided statistical data every year around 200 new students are admitted to the Bachelor's degree programme Biotechnology and Genetic Engineering. However, this number might differ from year to year. For example, in 2019 only 148 new students were admitted, but in 2021 there were 263 new students. The number of newly admitted students is determined by the Biotechnology and Genetic Engineering Department based on the available resources (number of faculty members and laboratory places). Undergraduate students at JUST have to pay tuition fees. The fees for each Bachelor's degree programme vary according to the operational costs of learning. For the Bachelor's degree programme Biotechnology and Genetic Engineering the tuition fee for regular students is currently 32 JOD (41,59 EUR) per credit hour according to university regulations. International students have to apply directly at JUST for admission and pay a higher tuition fee (~75 EUR per credit hour). The number of admitted students seems to be adequate; the students confirm this impression.

Academically distinguished students are eligible for scholarships. For example, the Student Research Fund offers grants for outstanding student's research. In addition, children of military personnel, receive free university education and children of JUST employees receive a high discount on their fees. Moreover, the King Abdullah Fund for Development (KAFD) awards a number of grants for underprivileged Jordanian students in order to ensure equality among Jordanians in education opportunities regardless of their financial status.

In summary, the experts consider the terms of admission to be binding and transparent. They confirm that the admission requirements support the students in achieving the intended learning outcomes.

Criterion 1.5 Work load and credits

Evidence:

- Self-Assessment Report
- Study plan
- Module descriptions
- Discussions during the audit

Preliminary assessment and analysis of the experts:
As described in the Self-Assessment Report, courses have between 1 to 3 credit hours. Laboratory courses are either offered as individual or as internal labs. Individual labs are worth 1 credit hour with usually 2-3 hours of tutorial or practical lab per week. For internal labs the workload is divided between the lectures (usually 2 hours/week) and a 2-3 hours lab per week. The allocation of credit hours to individual courses is based on course material and course expected outcomes, in addition to teachers' experiences. The curriculum committee monitors credit hour allocation and revises them every 3-4 years if necessary.

According to the module descriptions, JUST calculates 30 hours of students' total workload and has calculated the students' total workload, including time needed for self-studies, for each course. The respective information and the awarded credit hours as well as ECTS points are mentioned in every module description. The experts appreciate that JUST has made the work load calculation transparent in each module description, however, it would also be useful to include the information about the awarded ECTS points in the study plan.

Bachelor's students should not register less than nine and a maximum of 18 credit hours during the first and second semesters. However the maximum credit hours may reach 21, if students have a high GPA.

The experts confirm that the Biotechnology and Genetic Engineering programme has an adequate workload.

Criterion 1.6 Didactic and Teaching Methodology

Evidence:

- Self-Assessment Report
- Study plans
- Module descriptions
- Discussions during the audit

Preliminary assessment and analysis of the experts:

The learning method applied in the Bachelor's degree programme Biotechnology and Genetic Engineering is a combination of teacher-centred learning (TCL) such as classroom teaching/tutorials, demonstrations, and practical sessions, and student-centred learning (SCL) such as group discussions, and project-based learning. Each course can use one or a combination of several teaching and learning methods. Practical work in the laboratories is designed to impart good laboratory skills and is usually done as a group activity. The experts positively acknowledge that assignments and laboratory work are essential parts of many courses. The students learn procedural knowledge and hands-on skills under the teaching staff's supervision. The students are divided into small groups consisting of 15 - 25 students during the laboratory practise.

Students are regularly provided with assignments and homework that require answering, calculating, performing investigations, conducting comparative studies, analysing, exploring and coming up with conclusions. They are also given tasks such as writing projects and independent work that requires problem solving and higher order thinking. The field training can be performed in companies, at research institutes and laboratories or at JUST. However, the experts point out that it would be useful to offer seminaristic (seminar-like) kind of course or at least to integrate some seminar-like sessions in the regular lectures. This way, students can gain new insights and perspectives and it would help them to think creatively and to learn effective communication.

To help the students to achieve the intended learning outcome and to facilitate adequate learning and teaching methods JUST provides a digital learning platform. Teachers and students use it for presenting course material like papers and assignments and for communicating with each other.

In summary, the expert group considers the teaching methods and instruments to be suitable to support the students in achieving the intended learning outcomes. In addition, they confirm that the study concept comprises a variety of teaching and learning forms as well as practical parts that are adapted to the respective subject culture and study format. It actively involves students in the design of teaching and learning processes (student-centred teaching and learning).

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

The experts thank JUST for explaining that the Jordan Ministry of Higher Education has cancelled the option of offering sub-specialization, because it supposedly limits the students'

career perspectives. With respect to industrial biotechnology and bioinformatics, the Department has already filed a request to the university's management to hire new teachers from these two areas and respective electives will be offered. In addition, the Department of Biotechnology and Genetic Engineering will cooperate with the Faculty of Agriculture and will add a course in plant breading to the list of electives. To give students more hands-on experience in the area of plant biotechnology, experiments in plant tissue culture will be included by cooperating with a teacher from the Faculty of Agriculture, who is specialized in plant tissue culture and has a laboratory equipped with the necessary equipment.

The experts are glad that the Department of Biotechnology and Genetic Engineering will follow the students' suggestion to reduce the credit hours for general chemistry and offer more electives instead. Moreover, they acknowledge that JUST will purchase a small scale bioreactor so that students can gain hands-on experience in fermentation techniques.

With respect to supporting student in becoming genetic counsellors, the Department of Biotechnology and Genetic Engineering will offer a respective course which will introduce students to the concept of genetic counselling and thus will facilitate getting jobs in this field.

The experts confirm that JUST has updated the module descriptions for several courses to reflect the fact that CRISPR/Cas is taught and new books for these courses will be ordered through the library.

The experts see that, due to cultural issues, some students especially females will not travel and spend a semester abroad without a member of their family being with them. They support the Department of Biotechnology and Genetic Engineering in searching for opportunities to have more students studying abroad. Offering workshops to support students in taking part at mobility programmes is one step in the right direction.

The experts point out that if seminar-like sessions are already offered in some course, this should be made transparent in the respective module descriptions.

The experts consider criterion 1 to be mostly fulfilled.

2. Exams: System, concept and organisation

Evidence:

- Self-Assessment Report
- Module descriptions
- Study plan
- JUST Academic Calendar
- JUST Regulation for Examinations and Evaluation

Preliminary assessment and analysis of the experts:
According to the Self-Assessment Report, the students' academic performance is evaluated based summative assessment and the final exam. The maximum final score for each course is 100 points, and 50 points are required to pass. Forty points are allocated for the final examination, while 60 points are allocated for term work consisting quizzes, homework, assignments, oral presentations, laboratory work or term projects. Most of the exams are paper-based examinations and the duration for a term examinations is one hour, while final examinations last for up to two hours. Computer-based examinations are only held for classes with more than 100 students. The grade from laboratory work usually consists of laboratory skills, discussions, reports, and oral exams. The form of each exam and its contribution to the final grade are mentioned in the module descriptions, which are available to all stakeholders via JUST's homepage. Students can access their grades through the student service portal.

Students who miss an exam need to present a valid excuse to the Dean of the Faculty within one week after the cause is over. In this case, the teacher together with the Head of the Department, offers a make-up exam, which should be held within one week after the excuse is accepted.

Students may appeal a final grade by filling out an online application two weeks after announcing the results. The Dean discusses the appeal with the respective teacher and the Head of the Department and then forms a special committee in which the course's instructor is not a member. The committee reviews and verifies the exam and decides on the outcome.

At the end of each semester, students must attain a minimum of 50 points to pass the class. If a student fails a class, she/he can retake it as many times as necessary. It is also possible to repeat a class in order to improve the final grade. However no student is permitted to

repeat any course in which she/he already succeeded twice. For repeating failed examinations, students can retake the course during the summer semester or within the regular course of the next academic term. The further details are determined in JUST's General Regulations. The students confirm during the audit, that there is a general exam schedule, overlaps are avoided and they are informed in time about the exam dates.

The awarded grade are depicted in the following table:

Grade	Rating	English Code
95 - 100	distinguished	A+
85 - 94	excellent	A
80 - 84	Very Good	A-
77- 79	Good	B+
73 - 76	Good	B
70-72	-	B-
67-69	-	C+
63-66	-	C
60-62	-	C-
57-59	-	D+
53-56	-	D
50-52	-	D-
0-49	FAIL	F

Table 2: Awarded grades, Source: SAR JUST

The research project (Bachelor's thesis) is performed by student groups (research group) under the guidance of a supervisor. Experimental work or data collection begins shortly after the beginning of the semester and is completed two weeks before the final exams to allow adequate time for data analysis and report writing. Each student is expected to spend a minimum of 9 hours per week in the lab for the duration of the project. The quality of the experimental work/data collection is assessed by the project supervisor and is worth 40% of the final grade of the project, while the written report contributes 30 % to the final grade. Students will present and defend the results of their research project in an oral presentation during the "BioBiotech Research Week", scheduled before the last day of classes. Oral presentations will be 12 minutes followed by a 3-minute question period from the examination committee, who will then assign a grade. The oral presentation and defense of research projects is worth 30% of the final grade of the project.

With respect to the exams, the experts are convinced that it would be useful to put more emphasis on questions related to transfer skills and critical thinking. The mid-term and final exams should not only verify if the students have learned the content by heart but if they

understand the context and the reasoning behind it and are able to apply the acquired knowledge to new areas. In general, students should be better trained in critical and analytical thinking and acquire the ability to solve problems by self-determined application of what has been learnt. In addition, the share of exam questions dealing with transfer skills should be increased and should be highest in the latest semesters. Moreover, there should be more practical or oral exams in the laboratory courses so that the grading is not mainly based on written exams.

The experts also inspect a sample of examination papers and final theses and are overall satisfied with the general quality of the samples.

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

The experts understand that the Department of Biotechnology and Genetic Engineering has to follow university regulation with respect to the exams. Nevertheless, they recommend to reduce the number of written exams and to conduct more practical or oral exams in the laboratory courses so that the grading is not mainly based on written exams.

The experts consider criterion 2 to be mostly fulfilled.

3. Resources

Criterion 3.1 Staff and Development

Evidence:

- Self-Assessment Report
- Staff handbook
- Discussion during the audit

Preliminary assessment and analysis of the experts:

At JUST, the full-time staff members hold various academic positions. There are full professors, associate professors, assistant professors, lecturers and laboratory supervisors. Specifically, at the Department of Biotechnology and Genetic Engineering the faculty consists of 11 full professors, three associate professor, two assistant professors, three lecturers, and four laboratory supervisors. Practical laboratory work is supported by part time teaching assistants (master students).

Almost all of the staff members at the Department of Biotechnology and Genetic Engineering have done their PhD abroad and have spent some time at an international university. All professors (assistant, associate, and full) need to have a PhD, for lecturers a Master's degree is sufficient. The experts explicitly laude the international experience of the teachers and are convinced this will help to further promoting the internationalisation of the Department and the academic mobility of the students. The academic staff also gives classes for other majors (e.g. medicine).

The academic position of each teacher is based on research activities, publications, teaching, supervision of students and other supporting activities. New teachers are hired on a tenure track basis and have a maximum of ten years to achieve the requirements for the next academic level (assistant professor to associate professor). All promotions of teachers are evaluated by external experts.

The experts discuss with JUST's management how new staff members are hired. Vacancies are publicly announced via the official webpage of the University. JUST hires new staff members according to the needs and requests of the departments. Applicants would submit their request to the Office of Human Resources, which will determine whether candidates meet the qualifications outlined in the job posting and then forward it to the respective department. The department sets up a committee, who will interview the candidates and then give its recommendations to the Department Council for discussion. The decision will then be forwarded to the Office of Human Resources. In addition, JUST also searches actively for very qualified teachers if there is a specific vacancy in some area. Moreover, promising graduate students are sent abroad for a Master's and PhD programme and JUST hires them afterwards as lecturers or assistant professors.

The experts see that the teachers at the Department of Biotechnology and Genetic Engineering are professionally qualified and obtained their PhD degrees from abroad. Their research and teaching qualification profiles fit well with the scientific focus of the degree programme.

During the audit, the experts learn that associate and assistant professors have a teaching load of 12 credit hours per week and full professors have a teaching load of 9 credit hours. A reduction in teaching obligations for administrative tasks e.g. for the Dean and the Head of Department is in place.

Staff Development

At JUST, there are sufficient offers and support mechanisms available for teachers who wish to further develop their professional and teaching skills. For example, there is a Faculty Development Center at JUST that offers workshops for faculty members to improve

their teaching skills and to get acquainted with new didactical methods. All faculty members have to take part at a minimum of two workshops in order to get promoted. In addition, enough funds are available for spending time abroad e.g. for attending seminars, conferences or workshops or for taking part at research projects.

During the discussion with the experts, the teachers express their satisfaction with the support by the university and the opportunities for further didactic and scientific development.

A paid leave of absence for participating in international research projects is possible either during the summer time or for a whole semester (sabbatical) and several staff members graduated or received their PhD from international universities and have personal contacts with international universities. A sabbatical can be taken once every six years. The experts are particularly impressed by the regulation that double salary is paid by JUST during the sabbatical or the summer leave if the receiving university has a high international ranking. In addition, JUST covers the cost for participating at international conferences. The international orientation of the staff members is one of the strong points of the Biotechnology and Genetic Engineering programme.

Student Support

All staff members at JUST provide educational advice during their office hours (6 hours per week for each staff). The goal is to help the students with the process of orientation during the first semesters, the introduction to academic life and the university's community, and to respond promptly to any questions. They also offer general academic advice, make suggestions regarding relevant careers and skills development and help if there are problems. The students confirm during the discussion with the experts that the can approach all teachers if guidance is needed.

In general, students stress that the teachers are open-minded, communicate well with them, take their opinions and suggestions into account, and changes are implemented if necessary.

There is the Student Union at JUST, which was established in 1993. Students elect their representatives to the Student Council, who then chooses the Chairman and The Administrative Committee. The goal of the Students Union is to foster strong and mutually beneficial relationships between students and the university departments.

To promote students' professional career and to help them with finding suitable jobs, there is the King Abdullah Fund for Development (KAFD), which has an office at JUST. The aim of the office is to provide students with professional advice and technical consultation in communication skills and job search as well as linking the students' community with private companies and public institutions, at the national, and regional level.

Finally, there are several student organizations at JUST; they include student's activity clubs, which span a wide range of interests that include sciences, sports, music, outdoor recreation, culture, and other non-curricular activities.

The experts notice the good and trustful relationship between the students and the teaching staff; there are enough resources available to provide individual assistance, advice and support for all students. The support system helps the students to achieve the intended learning outcomes and to complete their studies successfully and without delay. The students are well informed about the services available to them.

Criterion 3.2 Funds and equipment

Evidence:

- Self-Assessment Report

Preliminary assessment and analysis of the experts:
JUST provides funding of the bachelor's degree programme Biotechnology and Genetic Engineering and the facilities. The university's primary source of income (80 % of the total budget) are derived from students' tuition fees. The rest (20 %) comes from profit centers like the olive trees and other services offered by JUST,

The Department of Biotechnology and Genetic Engineering has 11 teaching laboratories, this include laboratories for general biology, genetics, tissue culture, plant biotechnology, microbiology/microbial biotechnology, microbial genetics, protein biotechnology, molecular biology, hybridoma technology, and Biocomputing.

Faculty members supervise teaching in the laboratories and frequently involve students in their research activities (mainly during the research projects). The Faculty of Science and Arts has a number of central laboratories, which students have access to including a NMR facility, a liquid nitrogen facility, a biophysics laboratory, and number of chemical laboratories for chemistry courses such as organic chemistry, biochemistry and analytical chemistry. In addition, JUST houses Princess Haya Biotechnology Centre (PHBC) that is situated in the central hospital. The laboratories are fully equipped with some advanced instruments (e.g. real time PCRs, DNA sequencer, 2 D gel electrophoresis, DNA synthesizer, HPLC, metabolomics analyser) and can be used by the Bachelor's students for doing their research project.

The experts see that the available budget is sufficient for adequately conducting teaching and learning activities in the Biotechnology and Genetic Engineering programme. The mod

laboratories include almost all essential equipment. However, in order to promote students' involvement in research activities, it would be very helpful to establish and equip a central research lab at the Department of Biotechnology and Genetic Engineering where Bachelor's students can conduct their research projects. Additionally, it would be useful to establish a bioinformatics laboratory at the Department of Biotechnology and Genetic Engineering and to provide the necessary software and platforms, e.g. for teaching Python. Currently, a lab from the IT-Department is used for teaching the course but the availability is limited and not all required software is available

The experts emphasise that international safety standards need to be followed more strictly in the laboratories. For example, heavy gas bottles need to be fixed, emergency exits sign should be installed, wooden platforms should be removed from laboratories, personal safety measures should be applied, there needs to be hazard waste management, and safety instruction posters should be put up in every laboratory. Moreover, there should be a faculty member at the Department of Biotechnology and Genetic Engineering, who is assigned as the official biosafety officer. This information should be made transparent in all laboratories.

Students at JUST have access to the University Central Library. According to the information provided by JUST, the University Library offers core services for learning and research. Many students spend a considerable amount of their time in the Library and make use of its substantial and growing number of online resources. Through the library, students have access to more than 30.000 full text electronic journals, more than 55,000 electronic books, and to 58 databases. The students express their general satisfaction with the library and the available books and access to electronic literature and scientific databases. However, the budget for purchasing current scientific literature in the area of biotechnology and genetic engineering should be increased.

In summary, the expert group judges the available funds, the technical equipment, and the infrastructure (laboratories, library, seminar rooms etc.) to comply – besides the mentioned restrictions- with the requirements for adequately sustaining the degree programme.

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

The experts support the idea of using a vacant laboratory for establishing a central research lab at the Department of Biotechnology and Genetic Engineering where Bachelor's students can conduct their research projects.

The experts confirm that there is now an official biosafety officer at the Department of Biotechnology and Genetic Engineering. They also see that pictures of fixed gas cylinders, emergency signs, and fire extinguishers were submitted by JUST. However, the documentation is not complete because international safety standards need to be followed more strictly in all laboratories. For this reason, the experts expect a more comprehensive verification and documentation in the further course of the procedure.

The experts thank JUST for clarifying that no financial shortage with respect to acquiring new books, as the teachers can request any book to be purchased. However, the experts think that more current books (in print or digitally) should be purchased and be made available to students.

The experts consider criterion 3 to be mostly fulfilled.

4. Transparency and documentation

Criterion 4.1 Module descriptions

Evidence:

- Self-Assessment Report
- Module descriptions

Preliminary assessment and analysis of the experts:

JUST provides module descriptions that include all necessary information about teaching methods, awarded credit points, intended learning outcomes, content, admission and examination requirements, forms of assessment, details explaining how the final mark is calculated, and biographical references. However, while analysing the module handbook, the experts see that the literature references in the module descriptions are quite old and need to be updated and the module descriptions should be better aligned with the syllabus. In general, the module descriptions should reflect the current content of the course. For example, the content of the course “Pharmaceutical Biotechnology” is rather pharmacology and human genetics. Finally, some modules have lab sessions but the description of the labs (e.g. protein biotechnology BT452) is missing and it would very useful to make transparent what experiments students are doing in the lab sessions and to not call them “demonstrations”.

Criterion 4.2 Diploma and Diploma Supplement

Evidence:

- Self-Assessment Report
- Sample Transcript of Records
- Sample Diploma Certificate
- Sample Diploma Supplement

Preliminary assessment and analysis of the experts:
The expert group confirms that a Diploma Supplement is issued to all graduates of the Bachelor's programme Molecular Biology and Genetics. It includes all necessary information about the structure and content of the respective degree programme. It also informs about the qualification gained, including the achieved learning outcomes and the level and status of the pursued and successfully completed studies.

The Transcript of Records lists all the graduate's courses, the achieved credits, grades, and cumulative GPA.

Criterion 4.3 Relevant rules

Evidence:

- Self-Assessment Report
- Webpage JUST: https://www.just.edu.jo/Pages/Default.aspx
- Webpage Faculty of Science and Arts: https://www.just.edu.jo/FacultiesandDepartments/FacultyofScienceandArts/Departments/BiotechnologyandGeneticEngineering/Pages/Biotechnology%20and%20Genetic%20Eng.aspx
- Webpage Ba Genetic Engineering and Biotechnology: https://www.just.edu.jo/facultiesanddepartments/FacultyofScienceandArts/Pages/viewplan.aspx?planno=623
- Discussions during the audit

Preliminary assessment and analysis of the experts:
The experts confirm that the rights and duties of both JUST and the students are clearly defined and binding. All rules and regulations are published on the university's webpage.

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

The experts confirm that the module handbook has been updated in some areas. However, there is still room for improvement. For example, some literature references are still outdated and the experiments are still not mentioned in the lab courses and are still called "demonstrations".

The experts consider criterion 4 to be mostly fulfilled.

5. Quality management: quality assessment and development

Evidence:

- Self-Assessment Report
- Discussions during the audit

Preliminary assessment and analysis of the experts:
The experts discuss the quality management system at JUST with the programme coordinators. They learn that there is a continuous process in order to improve the quality of the degree programme and it is carried out through internal and external evaluation.

Internal evaluation of the quality of the Bachelor's degree programme Biotechnology and Genetic Engineering is provided through course exit surveys, a graduate exit survey and an alumni survey.

First, there is a course exit survey that is conducted in all undergraduate and postgraduate degree programmes of JUST. It is organised centrally by the Academic Development Centre (ADC) with the purpose of evaluating the performance of the teachers. This evaluation is conducted in every course at the end of each semester just before the final exams take place. It includes the same questions for all programmes and is done online. All students have to participate; otherwise, they are not allowed to take part at the final exam. The results are collected and analysed by the ADC. Each teacher receives his course evaluation results, which should serve as a guide for any improvement in the teaching process.

As the experts find out during the discussions with the teaching staff and the students, the results of the course exit surveys are usually not discussed with the students. The programme coordinators confirm that there is no feedback to the students about the satisfaction questionnaires. If there is negative feedback, the Dean of the College of Science and Arts talks to the respective teacher, analyses the problems, and offers guidance.

The experts gain the impression that the survey is mainly used for evaluating the teachers' performance and comparing them with each other in order to assist career development decisions and not for further developing the degree programme. The faculty members confirm that the survey results are taken into account if they want to be promoted (e.g. from associate professor to full professor).

Some teachers also discuss with their students directly how to improve the course but that practise is not common usage. The experts point out that the students' feedback has to be taken seriously by the teaching staff and changes should made if there is critique. For this reason, they expect that the students are informed about the result of the course surveys. In addition to the centralised satisfaction survey, which is conducted after the finals exams have taken place, it would be useful to have a specific questionnaire for all courses offered by the Department of Biotechnology and Genetic Engineering. This survey could be conducted a couple of weeks before the end of the semester so that teachers can give a feedback on the results to the students in one of the last course sessions. However, the feedback loops need to be closed and students need to be informed about the results of the satisfaction questionnaires and what steps may be taken to improve the situation if there are any issues

JUST also conducts a graduate exit survey by asking graduating students to evaluate the importance of each course that they have taken during the course of their studies and to determine the students' level of satisfaction with the respective degree programme.

Finally, JUST conducts an alumni survey. It is designed to provide feedback on the job perspectives and fields of employment of the graduates.

External quality assessment of the degree programme is carried out by the national Jordanian Accreditation and Quality Assurance Commission for Higher Education Institutions. All programmes at JUST are accredited by AQACHEI. Addionally, JUST put a strong focus on accrediting its programme inetrntionally. To this end, JUST is cooperating with several international accreditation agencys.

At JUST, there are students' representatives in the Board of Trustees and in other committees on university level. However it would also be useful to make students' representatives members of some committees on department level e.g. the curriculum committee. This way, they would be directly involved in the decision making processes. After the pandemic, elections for the Students Council were not taken up again, so currently there is no Student Council at JUST. The experts are not glad about this situation, as students' representation is an important part of university administration. To this end, JUST should reestablish the Students Council as soon as possible.

The experts learn from JUST's partners from public institutions and private companies that they meet with faculty members and discuss the needs and requirements of the job market and possible changes to the degree programme. In addition, there is an Alumni Office at JUST that tries to keep in contact with the graduates and that regularly organises a student fair with possible employers. Moreover, an Advisory Board with external stakeholders exists at the Faculty of Sciences and Arts and an additional one at the Department of Biotechnology and Genetic Engineering. As the experts consider the input of the employers to be very important, they appreciate their involvement.

With respect to internal quality assurance the experts point out that the Department Of Biotechnology and Genetic Engineering should know about the key performance indicators e.g. average length of studies and drop-out rates. The Department should analyse this data in order to identify any weaknesses and to incorporate the results into the continuous development of the programme. As no relevant numbers were provided, the experts ask JUST to provide statistical data on the average length of studies and the number of drop-outs.

In summary, the expert group confirms that the quality management system is suitable to identify weaknesses and to improve the degree programme. The students are somewhat involved in the process but not all feedback loops are closed. The experts stress that it is necessary to develop a culture of quality assurance with the involvement of all stakeholders in the process.

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

The experts acknowledge that JUST will take up their suggestion to conduct a specific questionnaire for all courses offered by the Department of Biotechnology and Genetic Engineering. This survey will be conducted in the middle of semester, while classes are still ongoing, so that the results can be discussed with the students in order to see if there is any room for positive modification of the course or the methods of teaching. The experts expect JUST to provide verification that these measures have been implemented

The experts thank JUST for explaining that, as per the university regulations, students are not represented in Board of Trustees nor in the Deans Council or the Department Council. Students are only represented in the University Council. However, in the Department of Biotechnology and Genetic Engineering one student is included in the curriculum committee.

The experts appreciate that elections for the Students Council will be held at end of May, 23, 2024.

The experts thank JUST for submitting statistical data on the number of drop-outs. However, the experts point out that no data with respect to average length of studies was provided and that the submitted data is quite old and ends with the academic year 2019/2020. For this reason, they expect JUST and the Department of Biotechnology and Genetic Engineering to provide current key performance indicators e.g. average length of studies and drop-out rates. To improve internal quality assurance, the Department of Biotechnology and Genetic Engineering should analyse the data and implement suitable measures if measures if any anomalies are identified.

The experts consider criterion 5 to be mostly fulfilled.

D Additional Documents

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

- Statistical data on the average length of studies and the number of drop-outs.

E Comment of the Higher Education Institution (10.05.2024)

JUST submits the following documents:

- Updated module handbook
- Biosafety officer letter
- Statistical data on the average length of studies and the number of drop-outs
- Mid Course Evaluation Form
- Department Request
- Information on safety measure

JUST submits the following statement:

“Page 10

ASIIN comment; The short summer semester is designed for students who have missed or failed some classes, but they have to pay extra fees for the summer courses. The summer semester lasts for eight weeks and students can only register for up to 12 credit hours.

JUST answer; In fact, students do not pay extra fees for the summer, the classes they register for in the summer are a part of the program and the hours are deducted from the 132 total hours and as such they are not paying extra fees.

Page 11

ASIIN comment; If students can specialize in various areas this would increase their career prospects and opportunities. This point of view is supported by all stakeholders. Useful areas of specializations include Cellular and Molecular Biotechnology, Industrial Biotechnology, Food Biotechnology, Plant Biotechnology, and Medical/Pharmaceutical Biotechnology. Offering different specialisations would allow students to follow their personal areas of interest and provide them with specific skills and knowledge that are required by specific industries and career paths within the broad field of biotechnology. Students could choose a specialization based on their interests, career goals, and the impact they wish to make in areas such as medicine, agriculture, energy, environment, or food production.

JUST answer; unfortunately, the ministry of higher education has cancelled the option of sub-specialization as it appeared that it limits the students’ careers upon graduation. In fact, Departments of Civil Engineering and Electrical Engineering at JUST used to have the sub specialization, but they have cancelled that based on the Ministry of Higher Education regulations.

In addition, it appears that it was limiting the career options of their graduates. Moreover, this option was cancelled from all government universities in Jordan.

Page 11

ASIIN comment; If some areas of specialization, e.g. industrial biotechnology are not covered by the faculty members, JUST should hire teachers with the respective academic qualification.

JUST answer: At this time we will ask the university to hire a faculty member of industrial biotechnology. Further, we will offer elective course in industrial biotechnology and a member from the faculty of pharmacy will teach it (Dr Sagar is specialized with pharmaceutical biotechnology). (Attached is the department council request for hiring faculty members in industrial biotechnology and bioinformatics).

Page 11

ASIIN comment; The experts also strongly recommend to cooperate more closely with the Faculty of Agriculture in order to connect the Biotechnology and Genetic Engineering programme with the areas of plant breeding and variety development.

JUST Answer: certainly we will seek collaboration with Faculty of Agriculture members who are specialized in plant breeding and see how can we enhance our program by encouraging our students to register for plant breeding course (PP 411) offered by the Faculty of Agriculture, Department of Plant Production. As a matter of fact, their students study general genetics in our department as a prerequisite for plant breeding PP 411 course. In the next plan modification, we will add plant breading to the list of our department elective courses.

ASIIN comment; Despite the quite comprehensive portfolio on general biotechnology and genetic engineering, the area “Plant Biotechnology” seems to be somewhat undernourished and requires substantial enhancement. Students, who want to gain a major in this field, which is of prime priority for Jordan, need hands-on experience in plant tissue culture, vector construction etc.

JUST Answer; We have already modified plant biotechnology syllabus were plant tissue culture become included in the laboratory experiments. Student’s hands on experience will be obtained at the tissue culture laboratory in Faculty of Agriculture. We have already initiated collaboration with Dr. Zakaria Al Ajluni from department of plant production who is specialized in plant tissue culture and have laboratory equipped with necessary equipments.

Page 11

ASIIN comment; The students emphasis that from their point of view two compulsory courses in chemistry (CHEM 101 and CHEM 102) and two courses in physics (PHY 101 and PHYS 102) is too much. They suggest to having just one course in general chemistry and one in general physics as offered in other study programs. This suggestion is supported by the experts and the Department of Biotechnology and Genetics should take it into consideration.

JUST Answer: in the next study plan review, we will remove 3 credit hours from general chemistry (we will ask students to take Chem 103 plus lab, Chem 107 instead of Chem 101, 102 and 107). The three credits will be added to department compulsory/ elective courses based on student's requests and the stakeholder's opinion.

Page 12

ASIIN comment; With respect to practical courses, the experts are convinced that students should get hands-on experience with fermentation technologies and bioreactors.

JUST Answer: definitely, we will purchase a small scale bioreactor in the next faculty budget cycle (this coming academic year) so that students can have a hands-on experience in fermentation techniques. In the same token, we do cover the theory of fine product production and purification including antibiotics, vitamins and other biological products in the Microbial Biotechnology course, BT 431 and in the protein Biotechnology course, BT 452.

ASIIN comment; The Department of Biotechnology and Genetic Engineering should support students in achieving the required certificates so that they can work as genetic counsellors after graduation.

JUST answer; in the next study plan modification, we intend to offer one or two credit hours genetic counseling course which will be taught by two specialized members of our faculty; Dr. Saeid Jaradat, and Dr. Asem Al Khateeb. This will introduce our students to the concept of genetic counseling and thus will facilitate having jobs in this field or at least prepares them for further advancements in this career path.

ASIIN Comment; Finally, the experts emphasise that especially in fast developing scientific topics such as biotechnology and genetic engineering it is very important that the Department keep track of new developments and teaches students new methods such as CRISPR/Cas. The programme coordinators explain that CRISPR/Cas is taught in the course "Microbial Biotechnology" (BT 431), however, the respective module description does not include this information. To this end, the Department of Biotechnology and Genetic Engineering needs to update the module description according to the currently taught content and to include state of

the art literature references. To achieve this goal, the budget for purchasing current scientific literature needs to be increased. Biotechnology is a rapidly changing area with new developments every year, so students and teachers need to be informed about new discoveries and need to have access to current scientific publications (see also criterion 4.1).

JUST answer; Microbial Biotechnology, molecular biology, basic biotechnology, plant biotechnology and animal biotechnology modules were modified to reflect the fact that CRSPR is taught and certainly new books for these courses will be ordered through the library. (Attached course handbook that reflects the above mentioned changes and the other required changes).

Page 13

ASIIN comment; However, they also point out that they wish for more places and scholarships for long- and short-term stays abroad. The number of available places in the mobility programs is still limited and there are restrictions due to a lack of sufficient financial support and personal circumstances. The experts recommend increasing the efforts to further internationalizing the programme by offering more places in international exchange programs especially for Biotechnology and Genetic Engineering students.

JUST answer; The number of student who could spend some time abroad is subjected to availability places which are solely offered by foreign universities. In addition, due to cultural issues, some students especially females cannot travel and spend a semester abroad without a member of their family being with them. This actually put a limitation on the final number of students who can participate in this program. In addition, the mobility committee in the department will search for opportunities to have more students study abroad. Furthermore, we have contacted the international relations office to offer workshops to enhance the student's ability to find places for spending some time abroad and in general to facilitate mobility of students.

Page 16

ASIIN comment; However, the experts point out that it would be useful to offer seminaristic (seminar-like) kind of course or at least to integrate some seminar-like sessions in the regular lectures. This way, students can gain new insights and perspectives and it would help them to think creatively and to learn effective communication.

JUST answer; this is done for several courses including the seminar course, scientific writing,

research project, animal biotechnology and other courses, such as the special topics. (Attached the course handbook).

Page 20

ASIIN comment; In addition, the share of exam questions dealing with transfer skills should be increased and should be highest in the latest semesters. Moreover, there should be more practical or oral exams in the laboratory courses so that the grading is not mainly based on written exams.

JUST answer; these suggestions will be taken in consideration in the next semesters. However, at the end we have to follow university policies on exam regulations.

Page 23

ASIIN comment; it would be very helpful to establish and equip a central research lab at the Department of Biotechnology and Genetic Engineering where Bachelor's students can conduct their research projects. Additionally, it would be useful to establish a bioinformatics laboratory at the Department of Biotechnology and Genetic Engineering and to provide the necessary software and platforms, e.g. for teaching Python.

JUST Answer; we have one vacant lab which use to belong to a retired faculty member. This laboratory will be used for this purpose. A proposal for a grant to equip this lab in the process of submission to Deanship of Research.

Page 24

ASIIN comment ; For example, heavy gas bottles need to be fixed, emergency exits sign should be installed, wooden platforms should be removed from laboratories, personal safety measures should be applied, there needs to be hazard waste management, and safety instruction posters should be put up in every laboratory. Moreover, there should be a faculty member at the Department of Biotechnology and Genetic Engineering, who is assigned as the official biosafety officer. This information should be made transparent in all laboratories.

JUST Answer; all these notes were taken care of, please see-attached pictures.

Also please find attached a document showing the assignment of a trained biosafety officer.

Page 24

ASIIN comment; However, the budget for purchasing current scientific literature in the area of biotechnology and genetic engineering should be increased.

JUST answer; we as members of the Biotechnology Department can at any time put a request for purchasing any book which will be automatically approved by the department head and dean. The library through their budges can buy any book or books that they get approved. At the end, there is no problem in acquiring any book that is related to academic programs.

Page 25

ASIIN comment; JUST provides module descriptions that include all necessary information about teaching methods, awarded credit points, intended learning outcomes, content, admission and examination requirements, forms of assessment, details explaining how the final mark is calculated, and biographical references. However, while analysing the module handbook, the experts see that the literature references in the module descriptions are quite old and need to be updated and the module descriptions should be better aligned with the syllabus. In general, the module descriptions should reflect the current content of the course. For example, the content of the course “Pharmaceutical Biotechnology” is rather pharmacology and human genetics. Finally, some modules have lab sessions but the description of the labs (e.g. protein biotechnology BT452) is missing and it would very useful to make transparent what experiments students are doing in the lab sessions and to not call them “demonstrations”.

JUST answer: the course handbook was corrected and modified to reflect the ASIIN committee concern.

Page 27

ASIIN comment; For this reason, they expect that the students are informed about the result of the course surveys. In addition to the centralized satisfaction survey, which is conducted after the finals exams have taken place, it would be useful to have a specific questionnaire for all courses offered by the Department of Biotechnology and Genetic Engineering. This survey could be conducted a couple of weeks before the end of the semester so that teachers can give a feedback on the results to the students in one of the last course sessions. However, the

feedback loops need to be closed and students need to be informed about the results of the satisfaction questionnaires and what steps may be taken to improve the situation if there are any issues.

JUST answer; certainly this suggestion is taken in consideration and the department chairman has already instructed all faculty members to conduct such survey which we already started. A form has been circulated to each faculty member to conduct this mid semester survey. (Attached a copy of the form).

Further, since the survey is conducted in the middle of semester while classes are still conducted, we will discuss with the students the results of the survey and see if there is any room for positive modification of the course or the method of teaching.

Page 28

ASIIN comment; At JUST, there are students' representatives in the Board of Trustees and in other committees on university level. However it would also be useful to make students' representatives members of some committees on department level e.g. the curriculum committee.

JUST answer; at JUST as per the university regulations, the students are not represented in board of trustees nor in the deans council or department council. Only students are represented in the University council. However, in the department of biotechnology and Genetic Engineering, there is a committee that contain students as main key players (In addition, one student (Yousef Wahwah) is included in the curriculum committee.

ASIIN comment; This way, they would be directly involved in the decision making processes. After the pandemic, elections for the Students Council were not taken up again, so currently there is no Student Council at JUST. The experts are not glad about this situation, as students' representation is an important part of university administration. To this end, JUST should reestablish the Students Council as soon as possible.

JUST answer; The elections will be held at end of May, 23, 2024. Please see the add for the elections that will be held this year.

ASIIN comment; With respect to internal quality assurance the experts point out that the Department Of Biotechnology and Genetic Engineering should know about the key performance indicators e.g. average length of studies and drop-out rates.

JUST answer; please find attached the required statistics as obtained from University Registrar**.**

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ASIIN comment; Statistical data on the average length of studies and the number of drop-outs.

JUST answer; as for the previous comment, the statistics on this matter is provided.

F Summary: Expert recommendations (23.05.2024)

The experts recommend the award of the seals as follows:

Degree Programme	ASIIN-seal	Subject-specific label	Maximum duration of accreditation
Ba Biotechnology and Genetic Engineering	With requirements for one year	-	30.09.2031

Requirements

A 1. (ASIIN 3.2) International safety standards need to be followed more strictly in the laboratories.

A 2. (ASIIN 4.2) Update the module descriptions with respect to the courses' actual content and the literature references.

A 3. (ASIIN 5) Close the feedback cycles and inform the students about the results of the course questionnaires.

A 4. (ASIIN 5) Provide current statistical data on the average length of studies and dropout rates. Analyse the data and implement suitable measures if any anomalies are identified.

Recommendations

E 1. (ASIIN 1.3) It is recommended to further promote the students' academic mobility and to establish more international cooperations.

E 2. (ASIIN 1.3) It is recommended to offer different areas of specialisation (majors).

E 3. (ASIIN 1.3) It is recommended to give students hands-on experience with fermentation technologies and bioreactors.

E 4. (ASIIN 1.3) It is recommended to reduce the number of compulsory courses in chemistry and in physics.

E 5. (ASIIN 1.3) It is recommended to cooperate more closely with the Faculty of Agriculture in the area of plant biotechnology.

E 6. (ASIIN 2) It is recommended to offer more seminaristic courses and to reduce the number of written exams.

E 7. (ASIIN 2) It is recommended to conduct more practical or oral exams in the laboratory courses so that the grading is not mainly based on written exams.

E 8. (ASIIN 3.2) It is recommended to establish a bioinformatics laboratory at the Department of Biotechnology and Genetic Engineering and to provide the necessary software.

E 9. (ASIIN 3.2) It is recommended to establish and equip a central research lab at the Department of Biotechnology and Genetic Engineering where Bachelor's students can conduct their research projects.

G Comment of the Technical Committees (10.06.2024)

Technical Committee 10 – Life Sciences (10.06.2024)

Assessment and analysis for the award of the ASIIN seal:

The Technical Committee supports the three requirements proposed by the expert group, which concern the improvement of safety standards in the laboratories, the module descriptions, the feedback of the results of the teaching evaluations to the students and the missing data on the average duration of studies and the success rates.

In addition, the Technical Committee follows the proposed nine recommendations in most points, which relate to points such as academic mobility, specialisations, cooperation with the Faculty of Agricultural Sciences, examination forms, courses in bioinformatics and laboratory equipment. With regard to recommendation E7, the Technical Committee proposes deleting the postscript, as this is already covered by recommendation E6. Otherwise, no changes are made to the requirements and recommendations

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

Degree Programme	ASIIN-seal	Subject-specific label	Maximum duration of accreditation
Ba Biotechnology and Genetic Engineering	With requirements for one year	-	30.09.2031

Recommendations

E 7. (ASIIN 2) It is recommended to conduct more practical or oral exams in the laboratory courses.

Technical Committee 14 – Medicine (04.06.2024)

Assessment and analysis for the award of the ASIIN seal:

The Technical Committee supports the three requirements proposed by the expert group,

which concern the improvement of safety standards in the laboratories, the module descriptions, the feedback of the results of the teaching evaluations to the students and the missing data on the average duration of studies and the success rates.

In addition, the Technical Committee follows the proposed nine recommendations, which relate to points such as academic mobility, specialisations, cooperation with the Faculty of Agricultural Sciences, examination forms, courses in bioinformatics and laboratory equipment.

The Technical Committee 14 – Medicine recommends the award of the seals as follows:

Degree Programme	**ASIIN-seal**	**Subject-specific label**	**Maximum duration of accreditation**
Ba Biotechnology and Genetic Engineering	With requirements for one year	-	30.09.2031

H Decision of the Accreditation Commission (28.06.2024)

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

The Accreditation Commission discusses the procedure and follows the assessment of the experts and the Technical Committees.

The Accreditation Commission decides to award the following seals:

Degree Programme	ASIIN-seal	Subject-specific label	Maximum duration of accreditation
Ba Biotechnology and Genetic Engineering	With requirements for one year	-	30.09.2031

Requirements

A 1. (ASIIN 3.2) International safety standards need to be followed more strictly in the laboratories~~.~~

A 2. (ASIIN 4.2) Update the module descriptions with respect to the courses' actual content and the literature references.

A 3. (ASIIN 5) Close the feedback cycles and inform the students about the results of the course questionnaires.

A 4. (ASIIN 5) Provide current statistical data on the average length of studies and drop-out rates. Analyse the data and implement suitable measures if any anomalies are identified.

Recommendations

E 1. (ASIIN 1.3) It is recommended to further promote the students' academic mobility and to establish more international cooperations.

E 2. (ASIIN 1.3) It is recommended to offer different areas of specialisation (majors).

E 3. (ASIIN 1.3) It is recommended to give students hands-on experience with fermentation technologies and bioreactors.

E 4. (ASIIN 1.3) It is recommended to reduce the number of compulsory courses in chemistry and in physics.

E 5. (ASIIN 1.3) It is recommended to cooperate more closely with the Faculty of Agriculture in the area of plant biotechnology.

E 6. (ASIIN 2) It is recommended to offer more seminaristic courses and to reduce the number of written exams.

E 7. (ASIIN 2) It is recommended to conduct more practical or oral exams in the laboratory courses.

E 8. (ASIIN 3.2) It is recommended to establish a bioinformatics laboratory at the Department of Biotechnology and Genetic Engineering and to provide the necessary software.

E 9. (ASIIN 3.2) It is recommended to establish and equip a central research lab at the Department of Biotechnology and Genetic Engineering where Bachelor's students can conduct their research projects.

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 Biotechnology and Genetic Engineering:

Program Educational Objectives (PEOs)

PEO1 Practices biotechnology in a broad range of industrial, scientific, managerial, and real-world applications.

PEO2; Pursues advanced education, research & development, and other creative innovative activities in Biotechnology, Business, and other professional careers.

PEO3: Graduates should responsibly conduct themselves in any setting they may find themselves in.

PEO4: Participate as leaders in their field of expertise and as entrepreneurs, in addition to supporting the services and economic developments throughout the world

Program Learning Outcomes (PLOs)

Upon completion of the BSc. in Biotechnology and Genetic Engineering degree, students will be able to:

PLO1 (A). Demonstrate knowledge and comprehension of core concepts, which includes but not limited to knowledge of cell biology, biochemistry, genetics, molecular biology, microbiology and immunology.

PLO2 (B). Exhibit basic laboratory skills necessary for the field of biotechnology and genetic engineering.

PLO3 (C). Utilize and apply knowledge of biotechnology in various applications in industry, medicine, agriculture and other related fields.

PLO4 (D). Demonstrate effective reading, critical thinking, and problem solving skills as well as exhibiting effective oral and written communication skills.

PLO5 (E). Recognize and understand ethical and social implications of the use of biotechnology and genetic engineering.

PLO6 (F). Demonstrate knowledge of contemporary issues in biotechnology and genetic engineering.

The following **curriculum** is presented:

	First Semester				Second Semester			
	Course No.	**Course Name**	**Cr. H**	**Prerequisite**	**Course No.**	**Course Name**	**Cr. H**	**Prerequisite**
Preparatory year	BT 101	General Biology (1)	3	-	BT 102	General Biology (2)	3	BT 101 Pass
	CHEM 101	General Chemistry (1)	3	-	BT 107	General Biology Laboratory	1	BT 102 or Concurrent
					CHEM 102	General Chemistry (2)	3	CHEM 101 Pass
	MATH 102A	Calculus 2 (for Biological Sciences)	3	-				
	ARB 102	Arabic Language	3	-	CHEM. 107	General Chemistry Lab	1	CHEM 102 or Concurrent
	LG 101	English Language (2)	3	Passing LG 099 or passing the English Exam with a grade of 50% & above	PHY 101 A	General Physics (1) (for Life Sciences Majors)	3	-
					HSS110 *	Social Responsibility	3	-
					HSS119 *	Entrepreneurship and Innovation	2	-
		Total	**15**			**Total**	**16**	

	Course No.	**Course Name**	**Cr. H**	**Prerequisite**	**Course No.**	**Course Name**	**Cr. H**	**Prerequisite**
Second year	BT 251	Cell Biology	3	BT 102 Pass + BT 107 Study	CHEM 233	Analytical Chemistry	3	CHEM 102 Pass + CHEM 107 Study
	BT 230	Basic Biotechnology	3	BT 102 Pass+BT107 PASS	CHEM 234	Analytical Chemistry Lab.	1	CHEM107+CHEM 233 or Concurrent
	MS 100	Military Sciences	3		MATH 132	Elements of Biostatistics	3	-
	CHEM 217	Organic Chemistry	3	CHEM 102 Pass	MATH 103	Mathematical Applications of Biological Sciences	3	MATH 102A
						University Elective 1	3	
	PHY 102A	General Physics (2) (for Life Sciences Majors)	3	PHY 101* A	CS 115*	Programming in C++	3	
	LM251	Introduction to Hematology	3	BT 102 +BT 107 study	PHY 107	General Physics Laboratory (for Non-Physics Students)	1	PHY 102A or Concurrent
		Total	**18**			**Total**	**17**	

	Course No.	Course Name	Cr . H	Prerequisite	Course No.	Course Name	Cr . H	Prerequisite
Third year	BT 231	General Microbiology	3	BT 102 Pass	BT 302	Bioinformatics	2	BT 230+CS115
	BT 233	General Microbiology Laboratory	1	BT 231 or Concurrent	BT 333	Immunology and Serology	3	BT 231 Study BT 351 Study
	BT351	Biochemistry	3	CHEM 217	BT 336	Immunology & Serology Laboratory	1	BT 333 or Concurrent
	BT353	Biochemistry Laboratory	1	BT 351 or Concurrent	LG 103*	Life Skills	2	-
	BT391	Scientific Writing & Presentation	1	BT230		Dept. Elective 1	2	-
		Univ. Elective 2	3			Dept. Elective 2	3	
	BT 341	Molecular Genetics	3	BT 251 Pass		Univ. Elective 3	3	-
	BT 344	Molecular Genetics Laboratory	1	BT 341 or Concurrent				
		Total	**16**			**Total**	**16**	

BT 399: Summer Training for 8 weeks (3 credit hours, 200 training hours)

	Course No.	Course Name	Cr. H	Prereq	Course No.	Course Name	Cr. H	Prereq
Fourth Year	BT 431	Microbial Biotechnology	3	BT 231 +BT233	BT 454	Molecular Biology (2)	2	BT 451 + BT 453
	BT 463	Tissue Culture and Hybridoma Technology	2	BT 336 and BT 233	BT 421	Plant Biotechnology	3	BT 230 Pass and BT 251 Pass
	BT 451	Molecular Biology (1)	3	BT 341 Pass	BT 456	Cytogenetics	3	BT441 Study
	BT 453	Molecular Biology Laboratory	1	BT 451 or	BT 491*	Seminar	1	Pass 90 C.H
				Concurrent				
	BT 411	Animal Biotechnology	2	BT 230 Pass and BT 251 Pass	BT 493**	Research Project	3	Pass 90 C.H
	BT 441	Human Genetics	3	BT 341 Pass		Dept. Elective 4	3	
		Dept. Elective 3	2					
		Total	**16**			**Total**	**15**	