ASIIN Seal

Accreditation Report

Bachelor's Degree Program
Chemistry

Provided by
University of Petra, Amman, Jordan

Version: December 6th 2024

Table of Content

A About the Accreditation Process

Name of the degree program (in original language)	(Official) English translation of the name	Labels applied for [1]	Previous accreditation (issuing agency, validity)	Involved Technical Committees (TC)[2]
عايميك	Bachelor of Chemistry	ASIIN	None	09
Date of the contract: 26.09.2023 **Submission of the final version of the Self-Assessment Report:** 01.04.2024 **Date of the onsite visit:** 08. – 12.07.2024 **at: Amman, Jordan**				
Expert panel: Prof. Dr. Klaus-Uwe Koch, Westfälische Hochschule Gelsenkirchen Bocholt Recklinghausen Prof. Dr. Veronika Hellwig, Technische Hochschule Lübeck Dr. Mohammed Al Ktash, Hochschule für Angewandte Wissenschaften Reutlingen Aya Khreis, University of Jordan, Student Representative				
Representative of the ASIIN headquarter: Dr. Iring Wasser				
Responsible decision-making committee: ASIIN Accreditation Commission for Degree Programmes				
Criteria used: European Standards and Guidelines as of 15.05.2015 ASIIN General Criteria as of 28.03.2023 Subject-Specific Criteria of Technical Committee 09 – Chemistry as of 29.03.2019				

[1] ASIIN Seal for degree programs
[2] TC 09 – Chemistry

B Characteristics of the Degree Program

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
Chemistry	Bachelor of Science		6	Full time	No	4 years	132 Jordan Credit Points,	Fall and Spring Semester/ 1991

The Department of Chemistry was established in September **1991**; the same year the University of Petra (UOP) was established. The Department offers a program leading to a Bachelor Degree in Chemistry. It also offers general courses for all university students and special courses to serve students of the Faculty of Pharmacy, Engineering, Information Technology and Medical Sciences.

For the Bachelor's degree program, Chemistry the University of Petra presents the following profile in its Self-Assessment Report:

The undergraduate curriculum includes each of four major chemistry sub- disciplines: analytical, inorganic, organic, and physical chemistry, leading to a B.Sc. Degree in Chemistry. The Department of Chemistry also offers general courses and specialized courses to serve students of other departments and other universities. Modern research instruments and equipment furnish the Department of Chemistry. The department is equipped with all sorts of chemicals and books.

Vision

The Department of Chemistry at University of Petra is an incubator of excellence in Jordan and the region, for students and scholars.

Mission

The Department of Chemistry prepares knowledgeable and competent chemists and other chemistry - related professionals who are committed to excellence in their professional

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

pursuits, with a sound background in both experimental and theoretical aspects of chemistry.

C Expert Report for the ASIIN Seal

1. The Degree Program: Concept, content & implementation

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

Evidence:

- Self-Assessment Report
- Module descriptions
- Learning objectives of each degree program according to the SAR (Self-Assessment Report) and the objective-module matrices
- Webpage Department of Chemistry: https://artsci.uop.edu.jo/En/Chemistry/Pages/default.aspx
- Discussions during the audit

Preliminary assessment and analysis of the experts:
The ASIIN expert team refers to the Subject-Specific Criteria (SSC) of the Technical Committee Chemistry as a basis for judging whether the intended learning outcomes of the Bachelor's degree program Chemistry as defined by the University of Petra correspond with the competences as outlined by the SSC.

The Self-Assessment Report of the UoP provides the following information regarding the competence profile and learning outcomes of the program under review:

General Objectives

The Department of Chemistry promotes the aims and objectives of UoP by providing high quality programs to its students, and by conducting related scholarly and service activities.

The overarching aims and objectives for the Bachelor of Chemistry program are as follows:

- Assisting students in acquiring and applying chemical knowledge.
- Training them to understand the discipline and the process of learning.
- Providing them with an acute awareness of the responsibility of a professional.
- Expanding the frontiers of chemistry by maintaining an active research program in the major fields of chemistry.
- Supporting professional and geographical communities on chemistry related activities with a commitment to active and ethical involvement.
- Employing modern electronic and blended teaching methods to increase student's ability to self-learning.

Intended Learning Outcomes

The Bachelor of Chemistry program according to the Self-Assessment Report disposes of the following Intended Learning Outcomes (ILOs) covering the following types of skills and competences.

Knowledge Skills:

Graduates accordingly should

K1. Demonstrate knowledge and understanding of essential facts, concepts, principles and theories, and describe the industrial applications related to organic, inorganic, analytical as well as physical chemistry.

K2. Know the Nomenclature and use of the suitable terminology of chemical compounds, either by common or systematic (IUPAC) names.

K3. Describe the principles of quantitative and qualitative chemical analysis, using conventional methods and instrumental techniques.

Intellectual Skills

Graduates should be able to

I1. Explain the nature and behaviour of chemical compounds, their classification, chemical structure, reactivity, mechanisms, physical properties, and characterizations using different techniques.

I2. Estimate chemical data by performing calculations and derivation related to general, analytical, physical, organic and inorganic chemistry.

Practical Skills

Graduates should be able to

PP1: Use of laboratory equipment and standard procedures safely.

PP2: Carry out careful and precise experiments and measurements to generate reliable data.

PP3: Prepare and separate compounds and analyse substances.

PP4: Use the scientific literature effectively, prepare scientific reports and make oral presentations.

Transferable Skills

Graduates should dispose of

T1. Communication skills, covering written, oral and electronic communications.

T2. Work effectively within a work team and research group

Personal Competences:

Graduates should be able to

PC1: Solve problems skill related to quantitative as well as qualitative information and problems when limited information is available.

PC2: Manage and control quality in factories, scientific and research institutions.

PC3: Engage in continuing professional development

PC4: Communicate and coordinate with others, participate effectively in work or research teams.

As part the SAR, the program coordinators submit a table aligning these program learning outcomes with those of the ASIIN´s Subject Specific Supplementary Notes for Chemistry. The expert team can confirm that the chemistry programs learning outcomes are generally aligned to these SSCs.

According to the SAR, these learning outcomes are reflected within the individual courses of the program. The individual instructors of courses are commissioned to write the descriptions of their respective learning outcomes for each course. The ILOs of bachelor chemistry program reportedly reviewed and modified on a regular basis.

During the interviews with various stakeholder groups on-site it becomes clear that within the Bachelor program under review, there are a variety of different “job profiles” available for chemistry students. A considerable number of students subsequently pursues a teaching career in schools and colleges; another group is working in chemical and pharmaceuti-

cal, mining or petrochemical companies. Other graduates choose to engage in the marketing profession. Almost no graduates are moving on to becoming independent entrepreneurs, though this is cited as one of the career options for graduates in the SAR. Some graduates finally choose continuing their academic career in the Master program.

Precise and systematically researched information about the professional pathways of UoP´s Bachelor graduates in Chemistry is unfortunately unavailable. Systematic tracer studies would however be very beneficial and instrumental in making potential adjustments to the curriculum. It would in the expert´s eyes also help to better structure the composition and selection of the electives for Bachelor students. While the experts thus confirm, that the chemistry programs learning outcomes are generally aligned to the subject specific learning outcomes of the ASIIN technical committee for Chemistry, they simultaneously see virtue in fine-tuning or defining more specific learning outcomes in line with the different professional careers cited above.

The experts positively note that the program learning outcomes have been published and are posted transparently and prominently in the department premises. At the same time, they cannot fully ascertain completely whether the Learning Outcomes have been really developed in a thorough stakeholder process. In the discussion with representatives from industry e.g., there is repeated mention of a "gap" between the expectations of industry and the university/department. The expert team before this background recommends reinforcing the communication channels between the industry advisory board and the department, which has come to life because of the first accreditation, to further work on modern competence profiles/learning outcomes jointly supported by both academia and professional practice.

As mentioned above, the expert team is incapacitated assessing to which degree graduates from the Bachelor program are successful on the national (or for that matter international) labor market due to a lack of systematic empirical evidence. The Department of Chemistry is therefore required conducting regular tracer studies regarding the professional trajectories and success of its graduates, using this information also to finetune and modernize the learning outcomes of the Bachelor in Chemistry program. As a side benefit, this would also help in building a more sustainable Alumni organization.

Criterion 1.2 Name of the degree program

Evidence:

- Self-Assessment Report

Preliminary assessment and analysis of the experts:
The experts find that the English translation and the original Jordanian name of the Bachelor's degree program Chemistry corresponds with the intended aims and learning outcomes as well as the main course language (English) and have no further comments.

Criterion 1.3 Curriculum

Evidence:

- Self-Assessment Report
- Study plan
- Module descriptions
- Webpage Department of Chemistry: https://artsci.uop.edu.jo/En/Chemistry/Pages/default.aspx
- Discussions during the audit

Preliminary assessment and analysis of the experts:

The department of Chemistry has developed and included in the Self-Assessment Report a comprehensive matrix demonstrating, which intended learning outcome should be achieved by which course. This matrix makes apparent that the objectives of the Bachelor's degree program Chemistry are substantiated by the courses and it is clear to the expert team, which knowledge, skills and competences students will acquire in each course. Only English textbooks are used and all exams (written or oral) are conducted in English. Sometimes, lectures are partly held in Arabic e.g. for explaining difficult problems or for making an important issue clear.

In summary, the experts agree that the curriculum in principle allows the students to achieve the intended learning outcomes.

Criterion 1.4 Admission requirements

Evidence:

- Self-Assessment Report
- Academic Regulations of the University of Petra
- Discussions during the audit

Preliminary assessment and analysis of the experts:

Admission to UoP mostly depends on the grades of the high school graduates. They must pass the Jordanian High School Diploma (Tawjihi) with a minimum grade of 60 % 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.

The experts note that the maximum enrolment number of students amounts to 260, in the last semester 120 freshman entered the university.

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

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

The intended learning outcomes for the Bachelor of Chemistry program have been published and are posted transparently and prominently in the premises of the Department of Chemistry. As there is a continued mention of a “gap” between the expectations of industry and the university/department, the expert team recommends reinforcing the communication channels between the industry advisory board and the department.

Precise and systematically researched information about the professional pathways of UoP´s Bachelor graduates in Chemistry is not available. Systematic tracer studies in the future will be very beneficial and instrumental in making potential adjustments to the curriculum. Introducing this instrument will also help to better structure the composition and selection of the electives for Bachelor students.

While the experts thus confirm, that the chemistry programs learning outcomes are generally aligned to the subject specific learning outcomes of the ASIIN technical committee for Chemistry, they simultaneously see virtue in fine-tuning or defining more specific learning outcomes in line with the different professional careers cited above.

The experts find that the English translation and the original Jordanian name of the Bachelor’s degree program Chemistry corresponds with the intended aims and learning outcomes as well as the main course language (English).

The experts agree that the curriculum in principle allows the students to achieve the intended learning outcomes.

They find the terms of admission to be binding and transparent and confirm that the admission requirements support the students in achieving the intended learning outcomes.

2. The Degree Program: Structures, methods and implementation

Criterion 2.1 Structure and modules

Evidence:

- Self-Assessment Report
- Study plan
- Module descriptions
- Academic Regulations of the University of Petra
- Webpage Department of Chemistry: https://artsci.uop.edu.jo/En/Chemistry/Pages/default.aspx

Discussions during the audit

Preliminary assessment and analysis of the experts:
The Bachelor's degree program Chemistry is offered by the Department of Chemistry, which is part of the Faculty of Arts and Sciences of UoP.

The undergraduate program introduces students to the core subjects of chemistry including inorganic, physical and organic chemistry, and biochemistry as well as analytical chemistry. The programme also conveys fundamentals in the natural sciences and information technology, particularly in physics, mathematics and biology.

The curriculum consists of nine different areas and covers a total of 132 CP. The first area is the University Compulsory Requirements, where students have attended the following four courses (12 CP): *National Education*, *Military Sciences*, *Arabic Language (1)*, and *English Language (1)*. The second, third and fourth areas are the University Elective Requirements where students can choose four electives (12 CP) out of the area's humanities (3 CP), social sciences (3 CP), and science and technology (6 CP). Not all these classes are subject-specific and every student at UoP has to cover these areas, independent of their major. The fifth part of the curriculum are the Faculty Compulsory Requirements (21 CP), these are introductory courses in the natural sciences such as: *General Chemistry (1 + 2)*, *General*

Chemistry Lab (1 + 2), *Calculus (1 +2)*, and *General Physics (1 + 2 + 3)*. Students should take these classes in the first two semesters.

The most important part of the curriculum is the Department Compulsory Requirements (57 CP). All chemistry students must attend these courses in their second to fourth year of studies. They cover the main areas of chemistry like biochemistry, organic, inorganic, analytical, and physical chemistry. Moreover, the seminar and the research project are also Department Compulsory Requirements. In the seminar students learn about scientific writing and do a presentation on a selected chemical topic. The core chemical classes are supplemented by the Department Elective Requirements. In this area students should attend five courses (15 CP). These courses offer students the opportunity of specialising in certain chemical areas such as *Surface Chemistry & Colloids*, *Computer Applications in Chemistry*, *Nuclear Chemistry*, *Petroleum Chemistry*, or *Environmental Chemistry*. The seventh part of the curriculum are the Department Supportive Compulsory Requirements (9 CP) with classes in *Differential Equations*, *Principles of Statistics*, and *Biology*. Finally, there are the Free Requirements (6 CP) where students can choose any two courses from any major at UoP.

The ASIIN expert teams considers the Bachelor of Chemistry a modern curriculum, which provides students with a solid education in Chemistry. The experts acknowledge that changes which had been requested on the occasion of the first accreditation have been introduced. The introduction of a compulsory course in toxicology and strengthening aspects of ethics and environment mostly in the form of a number of elective courses are steps in the right direction. They nevertheless see room for improvement in a number of areas:

The course on Scientific Writing takes places at the very end of their Studies. The experts see great value in offering this central course much earlier in the curriculum, so that students are getting familiar early one with the basic requirements for scientific writing, literature and database review and research.

During the discussions with students, it also becomes evident that there is value in engaging students in small independent research project to strengthen their interest in the discipline, prepare them for further studies in the Master program while opening new pathways for their future professional lives. The expert team can imagine that the community service, which is an integral, compulsory part of the curriculum (at the moment not credited), could be used for this purpose. Currently, the community service is interpreted very broadly (collect garbage on the campus facilities etc.), but could be used more beneficially to do small professionally sustainable projects in the field (waste treatment, water pollution e.g.).

System of Electives

As regards the system of electives, the ASIIN experts appreciate that there is a considerable range of elective courses available to students (there is a minimum enrolment requirement of five students to offer a course, sometimes external lecturers are contracted to deliver an elective course. The expert team at the same time sees value in providing more orientation, grouping the elective courses into coherent specialization areas for the students to choose from and guiding them in this process. The offered selection of elective subjects should then enable the focus on these specializations.

The experts also recommend strengthening the experimental and practical aspects in spectroscopy, to support the theoretical modules. This should include all steps of the experimental techniques (sample preparation, instrumental measurements and data evaluation as well as the interpretation of spectroscopical data, also supported by computer techniques. At the end, students could write a report in a scientific way. The experts also see value in adding an elective course in the area of chemometrics allowing the students to interpret the data in a modern way.

Internships

During the last accreditation visit, the topic of exposing graduates towards more practical experience in industry was raised, with all stakeholders alike stressing the importance of such a reform to improve graduates´ job perspectives. At the time, the main instrument for industry exposure for a considerable time has been visiting chemical and pharmaceutical plants. On the occasion of the last accreditation visit, plans were presented to officially introduce formal internships as an alternative to the research project and to conduct the research project outside UOP in a private company or research institution, thereby further promoting the contacts between UOP and its industry partners.

The experts learn that currently around 50% of the students today are opting for a research project (individual or in a team) within the department, the other half going for an internship within a company.

As regards the practical implementation of this internship, the experts after the discussion with different stakeholder groups find that this route is in need of further reform. There is a general sentiment that student during their internship are frequently used “as non-paid employees”, doing routine work instead of being engaged in a way, conducive to the success of their studies. There are also questions regarding the quantity and quality of available internships, the contractual relations with the host company, the tasks assigned to students, their supervision during their stay, the reporting exigencies. Before this background,

the experts expect a thorough reform of this vital element of the chemistry studies at the department (requirement).

They furthermore recommend supporting students in a structured process to complete their bachelor thesis also as an internship in industry or other suitable institutions working on a defined problem/question Professional support should be given by the supervising professor in cooperation with the companies' staff.

An internship office, which would entertain a database of suitable internships, engage in a structured formal process, would benefit all parties involved. After speaking to the representatives of industry, the experts recommend strengthening this route by interacting more systematically with industrial partners, by building a sound database of available (ideally paid) internships. This also will provide an entry route into the profession for the students and a continuous transfer between academia and industry. In conclusion: A reform of the internship program is warranted in the eyes of the experts.

International Mobility

The UoP in the past couple of years has built up an impressive number of partnerships with international universities around the world. In the department of chemistry however, this has not resulted in a notable progress as far as outgoing and incoming student mobility is concerned. Thus far, not a single student at the department has studied abroad. This is in contrast to the message received by the expert team during the discussion with students. Students really are burning to get international experience but cite a lack of opportunities as impeding factor.

What is also disturbing is the fact, that there has been no progress whatsoever since the last accreditation visit in 2018; at the time, outgoing mobility was equally non-existing. The program coordinators explain that UoP´s chemistry students do not go abroad due to language barriers, financial reasons and at times visa problems, all of which are not unsurmountable problems in the expert´s opinion.

While acknowledging the havoc caused by the Corona crisis and the financial challenges for studying abroad, the experts believe that systematic efforts are warranted to provide students with this opportunity. The ERASMUS exchange programs are certainly a step in the right direction, though the experts learn, that in the national Jordanian Erasmus office, chemistry is not among the disciplines qualified for student exchange.

In the expert´s opinion, the creation of joint degree programs with partners abroad, fixing a window of mobility in the structural design of the program will help to jumpstart international exchange opportunities. Having a formal policy on the recognition of credits, acquired from international exchange will also contribute.

The same finding also applies to incoming mobility. Currently there are only very students coming from neighboring countries (Palestine, Syria, Iraq), again there has been no progress in comparison to the last accreditation visit 5 years ago. The experts continue seeing value in professionalizing the recruitment drive for international students, also making use of the new possibilities of e-learning. Especially with regard to the goal to raising not only the number of outgoing students but also of the incoming international students the module handbook should be optimized to make it more comfortable to prepare learning agreements for those students (see also below).

Another aspect of internationalization is the recruitment of international guest lecturers to provide a more international learning environment. The experts are happy to learn, that there are promising negotiations (with individual HE institutions like the University of Jena or the German Academic Exchange Council), but thus far the tangible results have not been satisfactory and efforts need to be renewed.

The experts reiterate the finding of their colleagues in the prior accreditation that it is very useful for students to spend some time abroad already during their Bachelor's studies to improve their English proficiency and to enhance their opportunities for being accepted in an international Master's program. They expect the Department of Chemistry to formulate an Internationalization Strategy with measurable steps for implementing this strategy. The experts furthermore point to the existence of the European Chemistry Thematic Network, a European alliance of more than 100 Chemistry Departments throughout Europe and recommend liaising with ECTN to explore possibilities of international cooperation for the benefit of UoPs chemistry students.

Criterion 2.2 Workload and credits

Evidence:

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

Preliminary assessment and analysis of the experts:
The representatives of the UoP Chemistry Department present the Jordanian credit point system to the expert group. One Jordanian Credit Point (CP) is accordingly awarded for one hour of theoretical lecture or two to three hours of practical laboratory work. (Workload

indicates the time students typically need to complete all learning activities such as lectures, seminars, projects, practical work, self-study and examinations. The number of credits ascribed to each component are to be based on its weight in terms of the average workload students need in order to achieve the learning outcomes.

Typically, the estimated workload will result from the sum of:

- the contact hours for the educational component (number of contact hours per week x number of weeks)
- the time spent in individual or group work required to complete the educational component successfully (i.e. preparation beforehand and finalising of notes after attendance at a lecture, seminar or laboratory work; collection and selection of relevant material; required revision, study of that material; writing of papers/projects/dissertation; practical work, e.g. in a laboratory)
- the time required to prepare for and undergo the assessment procedure (e.g. exams)

Within the ECTS, one credit corresponds to 25 to 30 hours of students' work. The ASIIN expert team is presented with a table in which the Jordanian Credit Point System to the ECTS; the Bachelor of Chemistry correspondingly disposes of 240 ECTS. The experts consider this exercise very useful (as is the introduction of the Diploma Supplement, see below), as it provides the basis for establishing dual/joint programs with other international universities in the future with a uniform "academic currency"

During the last accreditation visit, the expert team had requested that the initial estimation of workload should be regularly refined through monitoring and student feedback. The UoP according to the information provided on-site has reacted conducting a Workload Survey among students to evaluate the time needed (lectures and laboratories, self-study time and preparation for exams).

The experts observe that during the interviews, none of the students has been aware of this process. What is nevertheless somewhat reassuring to the experts is the fact, that at the same time students unanimously confirm the workload to be adequate and manageable. Those, who have in recent past articulated from the entry route of vocational education, even put to the minutes that the workload is judged to be less challenging then e.g. the underlying diploma programs.

In summary, the experts conclude that there is no general structural pressure on the quality of teaching and the level of education due to the workload. The total workload appears to be adequate and the students are able to complete the degree program without exceeding the standard period of study.

Criterion 2.3 Teaching methodology

Evidence:

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

Preliminary assessment and analysis of the experts:
According to the SAR, in the Bachelor's degree program Chemistry, several different educational formats such as lectures, seminars, practical laboratory work as well as research projects.

The overall learning model at UoP aims at improving the students' competences through discussions, practical work, and lectures. Practical work 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.

Students are regularly provided with assignments and homework that require answering, calculating, performing investigations, conducting comparative studies, analysing, exploring and coming up with conclusions. In some instances, they are engaged independent work that requires problem solving and higher order thinking.

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

As regards the challenges with regard to an almost exclusive English-speaking environment, the experts find that the teaching staff is successful in tackling these challenges by a variety of remedial actions. Among these figures bi-lingual instruction in the first semester if needed as well as the provision of additional proficiency courses.

The lecturers also manage to deal with a diverse student body having very different starting conditions in terms of knowledge and learning abilities. They are successful in accommodating these differences, losing only a smaller percentage of students as drop-outs during their studies.

The interviewed students are predominantly satisfied with the level of teaching at the department, though they put to the minutes that there are some members of teaching staff, who are not living up to expectations. The expert team for its part is also pleased to meet

a very committed staff. They learn from some of the most senior staff members that the University is providing a particularly safe and constructive learning environment, in which professors and students profit from freedom of research and learning without external interference. Thus far, the university/department caters for the needs of local students, internationalization has thus are not materialized for the program under review.

The experts learn during the interviews that the teaching style at the Department of Chemistry is still predominantly traditional in the classical lecturer style as opposed to a more students-centered, problem-based teaching format. The expert group before this background suggests defining an official learning philosophy on the level of the UoP, manifesting the principles, for which teaching and learning at the university/department stands for. After the discussions with the teaching staff/professors as well as with the students the experts are convinced that the lecturers are genuinely interested in training the students to become competent and self-confident chemists or chemical engineers and in supporting/coaching them when temporary problems arise. Critical points or suggestions for improvement put forward by them should be regularly surveyed and, if appropriate, jointly implemented. Incentives should be created to try out and establish other teaching formats in addition to the teaching formats. Qualified conference visits should be supported.

The experts also point to the existence of modern pedagogical support tools in the area of chemistry, e.g. the planned “Eurolecturer Academy” operated by the European Chemistry Thematic Network Associations, in which practically all European faculties in the field of chemistry collaborate, and which provides professional guidance for “ambassadors of modern didactical approaches” (e.g. via Summer Schools) in the process.

Criterion 2.4 Support and assistance

Evidence:

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

Preliminary assessment and analysis of the experts:

The UoP according to its own account provides a sophisticated support system for students on different levels. It includes consultations with an advisor for academic affairs about graduation requirements and general study regulations. On a more personal level, teachers are

available for advice on each course. In addition, students have the opportunity to participate in student clubs and social activities.

There is a tutoring system in place. Each of the staff members is assigned a group of 10-15 students, which they assist throughout the course of their studies. Office hours are clearly marked, the staff members are accessible to all students according to the information provided during the interviews.

There is also an ongoing checking of students' progress during their studies. The teaching staff monitors this progress based on participation and preparation for the classes. If needed, remedial tutoring, summer classes etc. are provided to keep students from dropping out and progressing in time.

The students are provided with medical insure and psychological support if needed. There are student clubs in place and the students are full of praise regarding the vibrant campus life.

None of the interviewed students are getting financial assistance (the total cost for conducting amounts to around 7000 Dollar (55 JOD per Credit), a considerable number of students therefore has to get a job while studying. Housing is not an issue, as practically all students are living nearby in their families' home.

The experts in their summative analysis conclude that the system of support and assistance results in a trustful atmosphere between students and teaching staff and is one of the strengths of UoP. The experts during the interviews are reassured that staff at the Department of Chemistry is accessible and that 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. The students are well informed about the services available to them.

The expert teams learns of no additional requests of students, as regards the system of student support at the Department of Chemistry/the UoP. The experts are happy to learn that students feel comfortable at their Alma Mater and would recommend this study offer to their friends.

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

The ASIIN expert teams considers the Bachelor of Chemistry a modern curriculum, which provides students with a solid education in Chemistry. The experts acknowledge that changes, which had been requested as a result of the first accreditation, have been by and

large implemented. Having said this, the experts see value in the following curricular reforms: offering course on Scientific Writing not at the very end of their studies but much earlier in the curriculum is warranted, so that students are getting familiar early one with the basic requirements for scientific writing, literature and database review and research.

Furthermore, they recommend engaging students in small independent research project thereby strengthening their interest in the discipline and preparing them for further studies in the Master program while opening new pathways for their future professional lives. The expert team can imagine that the community service, which is an integral, compulsory part of the curriculum, could be used for this purpose.

The experts appreciate that there is a considerable range of elective courses available to students. They at the same time sees value in providing more orientation, grouping the elective courses into coherent specialization areas for the students to choose from and guiding them in this process. The experts also see value in adding an elective course in the area of chemometrics allowing the students to interpret the data in a modern way.

The experts also recommend strengthening the experimental and practical aspects in spectroscopy in support of the theoretical modules. This should include all steps of the experimental techniques. At the end, students could write a report in a scientific way.

As regards the internship experience, the experts expect a thorough reform of this vital element of the chemistry studies at the department. This finding relates to the quantity and quality of available internships, the contractual relations with the host company, the tasks assigned to students and the reporting exigencies. The supervising professor should give professional support in close cooperation with the companies' staff. An internship office, which would entertain a database of suitable (ideally paid) internships, engage in a structured formal process, would benefit all parties involved.

In terms of internationalization there is practically no outgoing and incoming student mobility at this stage in spite of the fact that students want to go abroad. While acknowledging the havoc caused by the Corona crisis and the financial challenges for studying abroad, the experts believe that systematic efforts are warranted to provide students with this opportunity. In the expert´s opinion, the creation of joint degree programs with partners abroad, fixing a window of mobility in the structural design of the program will help to jumpstart international exchange opportunities. Having a formal policy on the recognition of credits, acquired from international exchange will also contribute.

The experts also see value in professionalizing the recruitment drive for international students, making use of the new possibilities of e-learning. The recruitment of international guest lecturers will also contribute to providing a more international learning environment.

In summary, they expect the Department of Chemistry formulate an Internationalization Strategy with measurable steps for implementing this strategy. The experts point to the existence of the European Chemistry Thematic Network, a European alliance of more than 100 Chemistry Departments throughout Europe and recommend liaising with ECTN to explore possibilities of international cooperation for the benefit of UoPs chemistry students.

Concerning the workload, the experts conclude that there is no general structural pressure on the quality of teaching and the level of education. The total workload appears to be adequate and the students are able to complete the degree program without exceeding the standard period of study.

The experts learn during the interviews that the teaching style at the Department of Chemistry is still predominantly traditional in the classical lecturer style as opposed to a more students-centered, problem-based teaching format. The expert group suggests defining an official learning philosophy manifesting the principles, for which teaching and learning at the university/department stands for. The experts point to the existence of modern pedagogical support tools in the area of chemistry, e.g. the planned “Eurolecturer Academy” operated by the European Chemistry Thematic Network Associations, which provides professional guidance for “ambassadors of modern didactical approaches” in the process.

The experts conclude that the system of support and assistance results in a trustful atmosphere between students and teaching staff. The support system helps the students to achieve the intended learning outcomes and to complete their studies successfully. The students are well informed about the services available to them. The experts are happy to learn that students feel comfortable at their Alma Mater and would recommend this study offer to their friends.

3. Exams: System, concept and organization

Criterion 3 Exams: System, concept and organization

Evidence:

- Self-Assessment Report
- Study plan
- Module descriptions
- Regulation for awarding the Bachelor’s degree at the University of Petra
- Discussions during the audit

Preliminary assessment and analysis of the experts:
According to the Self-Assessment Report, a variety of examination forms is used for assessing the intended learning outcomes within the Department of Chemistry. In the course of the degree program, students' achievements are assessed by different methods such as assignments and homework, laboratory reports, presentations, quizzes and midterm as well as final exams. Exams may be written or online. Online exams mostly including multiple-choice tests and computational problems, while written exams typically include short questions, essays, and solving problems.

The form and contribution of each exam to the final grade is mentioned in the module descriptions that are available to the students via the Petra University Electronic Learning System (PUELC). The academic performance for each module is graded on a scale from 0 to 100. 40 points are allocated for the final examination, while 60 points are allocated for semester assignments consisting of written examinations and other types of assessment methods.

The semester's examinations for theoretical courses consist of at least two tests (written or online), and one test for practical courses; the exact dates are specified in the syllabus. The period for conducting the first test is the fifth and sixth week of the regular semester; the second test takes place is the eleventh and twelfth week. The final exam in each module is a written examination, which typically includes multiple-choice questions, essays, problem-solving or case-based questions and calculation problems.

Student need to repeat the compulsory course in case of failure. As for an elective course, students can either repeat it or take another elective course according to what is offered in the study plan. When repeating a course, the higher grade is calculated. All acquired grades are recorded in the student's transcript; however, in the case of repeating a course, the credit hours are only calculated once.

If students fail a class, they can retake it as many times as they like. It is also possible to repeat a class in order to improve the final grade. For repeating failed examinations, students can retake the course during the summer semester or within the regular course of the next academic term. The summer semester is an optional third term designed for students who have credit deficits or want to earn extra credits in order to complete the program prematurely. The further details are determined in UoP's Regulation for awarding the Bachelor's degree. The students confirm during the audit, that there is a general exam schedule and that they are informed in a timely manner about the exam date.

All chemistry students have to complete a graduation project; it is an individual or a small group (2-3 students) project. There are two possible paths for the graduation project. The first one is a research project with a topic from one of the main fields of chemistry (organic,

inorganic, physical or analytical). Students will collect all relevant information and papers and then conduct the necessary experiments. After finishing the experimental part, students write a short report comprising an introduction, the results, a discussion and conclusion in addition to references. The second possible path is a training project frequently connected to an internship (industrial training) in which students work for a couple of weeks in a chemical company. The experts learn that not all students submit a report in connection with the internship. The experts therefore suggest that in future also the internships should result in a written report comparable to a thesis.

All students have to do an oral presentation of their graduation project. In case of a group project, every student has to submit an individual thesis and do an individual presentation.

As far as the examination system at the UoP and the Department of Chemistry is concerned, during the Corona crisis it has changed to an electronic examination system. A considerable number of exams are multiple choice test using questions compiled in a question database. To a limited degree there are oral examinations and presentations such is the case for the final project and the laboratory assignments.

In the interviews with students, it becomes clear that in the department a traditional teaching style ”ex-cathedra” is still prevalent. The experts team suggests that a greater variety of exam formats are introduced (more orals) and used to accurately measure the achievement of the intended learning outcomes in line with a more student-centered, problem-based teaching philosophy.

The experts team furthermore reviews samples of exams, project reports and final theses provided by the Department. They see a need strengthening the experimental aspects of the Bachelor graduation project, paying renewed attention of reviewing current literature and applying modern methods/techniques. A bachelor graduation project, which is in line with level 6 requirements, requires not only advanced knowledge involving a critical understanding of theories and principles, but should also target advanced experimental skills and promote the ability to solve complex problems in a specialized professional field.

The experts confirm that there is a form of assessment for each course and that all students are well informed about the form of assessment and the details of what is required to pass the course. The organization of the exams guarantees that delays in the study progress are mostly avoided. The relevant rules for examination and evaluation criteria are put into a legal framework, as both students and lecturers confirm during the audit. The date and time of the exams and how the exams are taken is announced to the students in due time at the beginning of each semester.

The experts note with interest, that at the end of their studies, students have to take part in the National Competency Exam for all Jordanian students. It is a nationwide subject-specific test designed to verify the competencies gained by the students during their course of studies. In comparison with graduates from other Jordanian universities, students from the chemistry programme of UOP are doing very well in the National Competency Exam.

The experts conclude that the examinations are cum grano salis suitable to verify whether the intended learning outcomes are achieved or not.

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

The experts team suggests that a greater variety of exam formats are introduced (including more orals) and used to accurately measure the achievement of the intended learning outcomes in line with a more student-centered, problem-based teaching philosophy.

The experts see a need strengthening the experimental aspects of the Bachelor graduation project, paying renewed attention of reviewing current literature and applying modern methods/techniques. A bachelor graduation project, which is in line with level 6 requirements, requires not only advanced knowledge involving a critical understanding of theories and principles, but should also target advanced experimental skills and promote the ability to solve complex problems in a specialized professional field.

The experts confirm that there is a form of assessment for each course and that all students are well informed about the form of assessment. The organization of the exams guarantees that delays in the study progress are mostly avoided.

4. Resources

Criterion 4.1 Staff

Evidence:

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

Preliminary assessment and analysis of the experts:

4.1 Staff

In terms of Quantity and Quality of Staff, there are currently fifteen staff members, seven faculty members with PhD, three members with Master Degree, five members with B.S Degree. There is no significant difference between the different academic positions (professors, associate professors, and assistant professors) in their academic duties as faculty member but there is a difference in the respective workload and salary.

These staff members are teaching in the Bachelor and the new Master of Chemistry program (the latter offered since the academic year 2022-2023 on recommendation of ASIIN in the prior accreditation). In addition, staff members are providing to a limited degree teaching input for other faculties.

The contracts of staff members are renewed every year, the maximum contract duration amounts to three years; staff usually teaches 12 hours, additional teaching hours are remunerated additionally. There are state regulations in place, which foresee a student-staff ratio in the science fields of a maximum of 25:1. The corresponding maximum enrollment numbers amount to 260 students, currently the total enrollment number for the Bachelor Program amounts to 130, even considering the additional Master students these numbers are met.

The expert team is yet to be provided with a staff handbook, describing the academic qualifications of staff members. A considerable number reportedly has been trained in Germany at various HE institutions. Almost all staff members are coming from Jordan, some have also taught in neighboring Gulf States. Regular research activities and corresponding publications (1 publication minimum per year) are required. In the aftermath of the on-site visit, a more extended staff handbook is handed in.

The experts learn that there is a credit point system in place for staff activities including research, teaching, and supporting functions. Lecturers obtain credit points for each relevant activity and must achieve a minimum in each area and a certain number in total as a prerequisite for promotion. The interviewed staff members consider this process to be fair and transparent and utter no complaints.

The experts discuss with the UoP's management about the University's policies with respect to hiring new staff members. They learn that the Department of Chemistry is asked to submit an annual plan that describes what staff vacancies there are and what specific needs the Department has. Vacancies and job specifications are announced on UoP's webpage; candidates are invited to hold a presentation. During the last accreditation visit,

the ASIIN experts recommended collecting also the feedback from students on the performance of the candidates. They are pleased to learn that there is a dedicated committee for appointments and promotions within the Chemistry Department, which includes one student as a member. This committee enables direct student participation in the hiring process, "reflecting the university´s policy to promote transparency and encourage students´ input on job candidates", as the Department puts on minutes in its answer to the expert´s draft report.

During the discussion with the faculty members, the experts learn that there are enough resources for conducting research activities and that the teaching load is adequate. The academic staff also gives classes for other Faculties (e.g. in the Faculty of Pharmacy and Medical Sciences).

In summary, the ASIIN expert team considers the number and qualification level of the Teaching Staff sufficient for the execution of the Bachelor in Chemistry study program. They however recommend renewing efforts for recruiting additional and professional still active guest lecturers from abroad also probing into offers by the German Academic Exchange Council) and inviting guest lecturers from industry on a regular basis to familiarize students with the exigencies of the labor market/current hot topics.

Criterion 4.2 Staff development

Evidence:

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

Preliminary assessment and analysis of the experts:
There is reportedly a broad range of offers for professional development in place for academic and administrative staff members in the Department of Chemistry. They range from support measures for new staff members, assistance in switching to new e-learning formats in the wake of the Corona crisis, familiarizing staff members with modern didactical tools and approaches etc. The experts are interested to learn, that a year ago, the government mandated public universities to require new faculty members, as a condition for hiring, to obtain an academic work certification, which includes a course on teaching strategies and the use of the latest methods and techniques in education. This course could also be attended by staff currently teaching at the Department of Chemistry.

During the onsite discussions, the interviewees confirm that the Academic Development

Centre in charge regularly contacts them at the beginning of each semester. At this point in time, they are offered a range of professional development courses. All faculty members have to take part in workshops in order to be promoted.

There is equally a range of incentive systems in place, such as additional remuneration for extra teaching hours, for successful publications (financial assistance for publications is also given to a limited degree). In addition, limited funds are available for spending time abroad e.g. for attending seminars, conferences or workshops or for taking part in research projects.

The expert team acknowledges that the UoP is providing adequate possibilities for professional development, especially before the background that they do not hear of any no further demands on the part of staff in this area during the discussions.

Criterion 4.3 Funds and equipment

Evidence:

- Self-Assessment Report.
- On-site-visit of the laboratories, classrooms, and the library
- Discussions during the audit

Preliminary assessment and analysis of the experts:

During the on-site visit, the expert group visits the teaching and research facilities in order to assess the quality of infrastructure and technical equipment. The Department has invested in upgrading the safety features/regulations in the laboratories as requested. A number of concerns nevertheless remain:

Chemical cabinets for flammable solvents were installed since the last visit. However, it is worrying that the solids, including the toxic ones, are still accessible to everyone in normal hanging cabinets in the laboratories. Such hazardous substances should also be stored in suitable, ventilated chemical cabinets. Toxic substances should be excluded or avoided in the lab courses for beginners. In any case, toxic substances must be stored in locked cabinets and only authorized persons should have access to them. The experiments should be designed in such a way that only a minimum amount of hazardous waste is produced. Lab safety and waste management should be part of the learning outcomes practical courses. The wearing of personal protective equipment must be mandatory. Teaching staff must always fulfil their role model function in these matters and should also be regularly trained and instructed accordingly.

As regards the laboratories, there are altogether six laboratories in place, which contain the most essential equipment necessary for successfully reaching the competence profiles of the Bachelor in Chemistry program. Some of the necessary equipment for teaching is only available in the Department of Pharmacy, as this department is strong in research and acquisition of funding. In terms of equipment, the expert team recommends investments in the following apparatus to strengthen the practical training for the students:

- 90 MHz NMR for the purpose of quantitative and quantitative analyses, identification of synthesized substances, pre-analysis of substances which are planned to be sent to the big machine at Jordan University, interpretation of 1H-/13C-/2D-NMR-Spectra.
- Bomb calorimeter as the existing one is quite rotten
- GC-MS (quantitative analyses, interpretation of Mass Spectra)
- Elemental Analyses (identification of substances)

It is furthermore recommended increasing the number of exhaust fans in the laboratories, remove any covers that affect the efficiency of the exhaust fans, provide the laboratories with clear, international colorful labels and a board displaying the experiments that will be conducted in that lab.

Overall, the university benefits from the resources of the Pharmaceutical Department and equally from the cooperation with the University of Jordan. The only drawback in the expert´s opinion is the lack of written cooperation agreements between the cooperation partners.

General safety procedures are to be considered in the SEM laboratory. A schedule for a monthly inspection of the eyewash station and a regular inspection of the body shower should become a routine.

The UoP library offers access to electronic scientific and educational resources and to the electronic library system, including current publications that are needed for study and research. Overall, the students are satisfied with the available literature and services provided by the library. They also express their general satisfaction with the available resources and conditions of studying.

The experts in summary consider the resources to be sufficient, provided that the above stated requirements and recommendations are implemented.

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

The ASIIN expert team considers the number and qualification level of the Teaching Staff sufficient for the execution of the Bachelor in Chemistry study program. They however recommend renewing efforts for recruiting additional and professional still active guest lecturers from abroad and inviting guest lecturers from industry on a regular basis to familiarize students with the exigencies of the labor market/current hot topics.

The expert team acknowledges that the UoP is providing adequate possibilities for professional development. The requested documents, additionally handed in after the onsite visit, confirm this finding.

General safety procedures are to be considered in the SEM laboratory. A schedule for a monthly inspection of the eyewash station and a regular inspection of the body shower should become a routine. Toxic substances should be excluded or avoided in the lab courses for beginners. They must be stored in locked cabinets and only authorized persons should have access to them. The experiments should be designed in such a way that only a minimum amount of hazardous waste is produced. Lab safety and waste management should be part of the learning outcomes practical courses. The wearing of personal protective equipment must be mandatory. Teaching staff must always fulfil their role model function in these matters and should also be regularly trained and instructed accordingly.

As regards the laboratories, they contain the most essential equipment necessary for successfully reaching the competence profiles of the Bachelor in Chemistry program. Some of the necessary equipment for teaching is only available in the Department of Pharmacy, as this department is strong in research and acquisition of funding. In terms of equipment, the expert team recommends investments in the following apparatus to strengthen the practical training for the students:

- 90 MHz NMR for the purpose of quantitative and quantitative analyses, identification of synthesized substances, pre-analysis of substances which are planned to be sent to the big machine at Jordan University, interpretation of 1H-/13C-/2D-NMR-Spectra.
- Bomb calorimeter as the existing one is quite rotten
- GC-MS (quantitative analyses, interpretation of Mass Spectra)
- Elemental Analyses (identification of substances)

It is furthermore recommended increasing the number of exhaust fans in the laboratories, remove any covers that affect the efficiency of the exhaust fans, provide the laboratories

with clear, international colorful labels and a board displaying the experiments that will be conducted in that lab.

5. Transparency and documentation

Criterion 5.1 Module descriptions

Evidence:

- Self-Assessment Report
- Module descriptions
  - Webpage Department of Chemistry: https://artsci.uop.edu.jo/En/Chemistry/Pages/default.aspx
- Discussions during the audit

Preliminary assessment and analysis of the experts:
The Module Handbook for the Bachelor program has meanwhile become a comprehensive document, which contains the most important information (responsible lecturer, teaching methods and workload, credits points, module content, admission and examination requirements, forms of assessment, recommended literature etc.).

As regards the formulation of the intended learning outcomes, however, the expert team continues to see room for improvement, making still better use of Blooms Taxonomy in the process. The wording in a number of instances is not competence oriented but rather imperative and from the teacher´s view (what is taught), therefore the ILO´s do not differ from the table of contents of the corresponding lectures.

The course objectives are quite often listed as very general statements (nearly the same text but only the name of the subject is changed). Some good examples of course objectives are given in Analytical Chemistry and Toxicology. The ILO are sometimes only a list with the points also shown in the Topic Details of the Course Schedule (example Physical Chemistry I).

The experts confirm that the module descriptions (syllabus) are accessible to all students and teachers via the Petra University Electronic Learning System (PUELC). They contain the essential information needed and are a valuable resource to stakeholders. At the same time, the module handbook could certainly be designed more reader-friendly. For the most

part, the wording and format-ting of the texts is not consistent, and navigation in the document is not supported. If an international student or the associated professor were to work out a learning agreement on this basis, this would probably be very exhausting,

Criterion 5.2 Diploma and Diploma Supplement

Evidence:

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

Preliminary assessment and analysis of the experts:
The experts acknowledge that students at the Department of Chemistry are awarded a Diploma Certificate and a Transcript of Records after graduation.

During the last accreditation visit, the ASIIN expert team had noticed that no Diploma Supplement existed at UoP. They at the time had point to the importance of the Diploma Supplement, which has been introduced as a standard tool, next to the ECTS, fostering academic and professional mobility within the European Higher Education Area and beyond. Its main function is to uniformly inform about the structure and content of the respective degree program and includes a description of the academic career, the competences acquired during the studies, explaining the qualification gained including the achieved learning outcomes and the context, level, content and status of the studies that were pursued and successfully completed.

The University of Petra has now presented as part of the Self-Assessment Report the Draft of a Diploma Supplement, which exists thus far only on paper and has not been given automatically to students upon graduation. Acknowledging, that the UoP has its own transcript of records, the expert team request that the DS as a central tool for the promotion of academic and professional mobility is implemented without further delay. The Diploma Supplement must be automatically issued together with UoP's diploma after graduation. The graduates benefit from this standardised document because this way their academic qualification is more easily recognised abroad, the description of their academic career and the competences acquired during their studies are included, and it offers them easier access to opportunities for work or further studies abroad. Graduation represents the culmination of the students' period of study. Students need to receive documentation explaining the qualification gained, including achieved learning outcomes and the context, level, content and status of the studies that were pursued and successfully completed.

Criterion 5.3 Relevant rules

Evidence:

- Self-Assessment Report
- Webpage Department of Chemistry: https://www.uop.edu.jo/En/Academics/FacultyofArtsandSciences/DepartmentofChemistry/Pages/default.aspx
- Legislation Guide
- Academic Rules
- Regulation for awarding the Bachelor's degree at the University of Petra
- Discussions during the audit

Preliminary assessment and analysis of the experts:

The UoP and the Department of Chemistry dispose of extensive documentation, in which the rights of relevant stakeholder like students and staff are clearly defined and made accessible. The rights and duties of both UoP and the students are clearly defined and binding. All rules and regulations are available via the Petra University Electronic Learning System (PUELC).

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

The experts confirm that the module descriptions (syllabus) are accessible to all students and teachers via the Petra University Electronic Learning System (PUELC). They contain the essential information needed and are a valuable resource to stakeholders. At the same time, the module handbook could certainly be designed more reader-friendly. For the most part, the wording and format-ting of the texts is not consistent, and navigation in the document is not supported.

As regards the formulation of the intended learning outcomes, the expert team recommends making l better use of Blooms Taxonomy in the process. The wording in a number of instances is not competence oriented but rather imperative and from the teacher´s view therefore the ILO´s do not differ from the table of contents of the corresponding lectures.

Acknowledging, that the UoP has its own transcript of records, the expert team request that the DS as a central tool for the promotion of academic and professional mobility is implemented without further delay. The Diploma Supplement must be automatically issued together with UoP's diploma after graduation.

The UoP and the Department of Chemistry dispose of extensive documentation, in which the rights of relevant stakeholder like students and staff are clearly defined and made accessible. The rights and duties of both UoP and the students are clearly defined and binding. All rules and regulations are available via the Petra University Electronic Learning System.

6. Quality management: Quality assessment and development

Criterion 6 Quality management: quality assessment and development

Evidence:

- Self-Assessment Report
- Discussions during the audit
- Academic Rules

Preliminary assessment and analysis of the experts:
The UoP and the Department of Chemistry dispose of an extensive system of external as well as internal quality assurance.

As regards the **external QA system**, the expert team is impressed by the strategic decision of the UoP leadership to use international accreditation as a central tool of self-improvement. The UoP has invited a broad range of international accreditors to provide feedback on the further development of its study programs and provide international recognition for them, which the expert team appreciates.

As regards UoPs and the Department´s **internal QA system**, on the i**nstitutional level**, there are a certain number of committees in place on the central administration level. The Quality Assurance Department, the Strategic Planning and Follow Up Office, the Performance Management Unit and the Internal Research Office all collect and process the QA data generated by a considerable number of different tools (see below). In terms of available QA staff, on the central level, there are 7 staff members looking after all aspects of QA, there are however no corresponding resources on the level of the faculties/departments. All the responsibilities are assigned to the head of the department/lecturers who are dealing with a full teaching load and other administrative responsibilities on the side.

On the **procedural level**, there are a broad range of instruments in place such as student evaluations on the quality of courses and the performance of lecturers, student workload

surveys, surveys among the teaching staff related to their satisfaction with working conditions as well as surveys among graduates/alumni. In addition, each semester senior students are asked to evaluate their achievement of the program student outcomes / competencies through the graduating seniors' survey.

Student evaluations are administered electronically and are 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 Quality Assurance Department. Each teacher receives his course evaluation results, which should serve as a guide for any improvement in the teaching process.

While the expert team appreciates this comprehensive approach, it nevertheless sees room for improvement in a number of areas:

In the interviews with students and staff alike, it also becomes evident that the concerned stakeholders see these questionnaires as a bureaucratic must. They have to be done in order to get access to the exam results. Students do not see a direct impact on their responses and complain that there is that no direct feedback is provided after the questionnaires have been filled out. This was already the finding of the prior accreditation visit and in this aspect, no progress can be monitored. The expert team before this background requests a reform of the mechanisms by which, the surveys are used and further processed, feedback loops need to completely closed. They also can imagine that there are alternative instruments to capture the input of stakeholders for the further improvement of the institutions.

What is also crucially missing and needs to be implemented, are dependable tracer studies, giving clear information about the professional whereabouts and career paths of graduates from the Bachelor in Chemistry Study Program.

The experts acknowledge that on the cultural level there is evidence of a participatory approach to QA matters (as exemplified by 22 recommendations given by the staff in the department meeting), but thus far there has been not follow up on these recommendations.

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

In summary, the expert group confirms that the external and internal quality management system is suitable to identify weaknesses and to improve the degree program with the above noted exceptions. The students are involved in the process but not all feedback

loops are closed. Systematic tracer studies need to be implemented. It is further advisable further develop a culture of quality assurance with the involvement of all stakeholders in the process.

D Additional Documents

Before preparing their final assessment, the panel ask 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:

- Data on Progression/ Completion/Drop out Rates for recent student cohorts of the Bachelor of Chemistry program.
- Staff handbook
- Participation of staff member in Professional development courses in the past three years
- Quality Assurance Manual

E Comment of the Higher Education Institution (06.11.2024)

In the aftermath of the on-site visit, the Department of Chemistry has reacted and handed in the requested documents.

The comments in the ASIIN report:

No.	The comment	Page No.	The response	The attached file name
1.	Dear Colleagues, please provide us with a systematic overview of the progression and drop-out rates of recent student cohorts to support this (preliminary) finding.	18	The chemistry department communicated with the admission and registration deanship at UoP. We obtained data in Arabic, which is translated and shown in the attached file.	Number of graduates and dropout students
2.	Dear Colleagues of UoP, can you comment on this recommendation of experts in the prior accreditation and whether our finding is correct?	24	There is indeed a dedicated committee for appointments and promotions within the Chemistry Department, which includes one of the department's students as a member. This committee enables direct student participation in the hiring process, reflecting the university's policy to promote transparency and encourage students' input on job candidates. The student member contributes their perspective on the candidates' performance, helping ensure that new hires align with students' expectations and educational needs. Engaging students in such committees is an important step	Department Committees-Chemistry 2023-2024

			in enhancing the academic environment, improving the learning experience, and according to the accreditation experts' recommendations to incorporate students' views in academic decision-making.	
3.	Dear Colleagues of UoP, we were promised a list, which courses the 15 staff members have been taken in the past three years.	25	The Chemistry Department at UoP collected a wide range of training courses held by the Academic Development Center, in which the employees of the Department of Chemistry participated. A file includes a list of training courses and workshops in the academic year 2023-2024 is also included.	List of training courses + list of training courses and workshops 2023-2024
Additional documents:				
○ Staff handbook		33	The staff handbook is available in the Arabic language only, there is a more comprehensive file in the English language is added in the reply e-mail	Legislations guide UOP 2016
○ Quality assurance manual		33	The file in the English language is available and attached in the reply e-mail	Quality Manual

The experts have analyzed the information provided and incorporated the comments in its report.

F Summary: Expert recommendations (08.11.2024)

Taking into account the additional information and the comments given by UoP, the experts summarise their analysis and **final assessment** for the award of the seals as follows:

Degree Program	ASIIN seal	Subject-specific Label	Maximum duration of accreditation
Ba Chemistry	With requirements for one year	-	30.09.2031

Requirements

A 1. (ASIIN 1.1) Systematic tracer studies need to be implemented to provide data on graduates' career paths and use this data for modernizing the competence profiles and for curriculum adjustments.

A 2. (ASIIN 2.1) The course on scientific writing must be offered earlier in the curriculum to familiarize students with basic research and writing skills early on.

A 3. (ASIIN 2.1) The internship system must be reformed ensuring that students engage in meaningful tasks during their internships, with improvements in quality, supervision, and reporting of the internship experience not least to achieve equivalence to the level of a Bachelor thesis.

A 4. (ASIIN 2.2) If the community service forms a compulsory part of the curriculum, it must be credited.

A 5. (ASIIN 3) The experimental aspects of the Bachelor graduation project must be strengthened, paying renewed attention of using modern literature.

A 6. (ASIIN 4.3) It is required investing in additional storage cabinets for toxic substances and avoid using these in early year courses.

A 7. (ASIIN 5.2) A Diploma Supplement must be automatically issued to all graduates to facilitate international recognition and mobility.

A 8. (ASIIN 6) The mechanisms by which student surveys are used and further processed must be reformed closing the feedback loops along the lines described in this report.

Recommendations

E 1. (ASIIN 2.1) The community service component should be enhanced by allowing students to work on small, discipline-related projects.

E 2. (ASIIN 2.1) It is recommended strengthening the experimental and practical aspects in spectroscopy, to support the theoretical modules. This should include all steps of the experimental techniques (sample preparation, instrumental measurements and data evaluation as well as the interpretation of spectroscopical data, also supported by computer techniques. At the end students should be challenged to write a report in a scientific way. The experts also see value in adding an elective course in the area of chemometrics allowing the students to interpret the data in a modern way.

E 3. (ASIIN 2.1) Elective courses should be grouped into coherent specialization areas to provide clearer pathways for students and align with specific professional skills. Students should be guided through this process.

E 4. (ASIIN 2.1) It is recommended establishing an internship office to manage internships, maintain a database of opportunities, and formalize processes.

E 5. (ASIIN 2.1). The Department of Chemistry should formulate and implement an Internationalization Strategy with measurable steps along the lines described in this report.

E 6. (ASIIN 2.1) Efforts should be strengthened to support student mobility through partnerships, language preparation, and potentially ERASMUS programs.

E 7. (ASIIN 2.1) It is recommended increasing the involvement of active international and industry guest lecturers to provide diverse perspectives and industry insights.

E 8. (ASIIN 2.3) It is recommended defining an official learning philosophy manifesting the principles, for which teaching and learning at the Department/University stands for.

E 9. (ASIIN 3) It is recommended using a greater variety of exam formats, also with a renewed emphasis on oral examinations, to accurately measure the achievement of the intended learning outcomes in line with a more student-centered, problem-based teaching philosophy.

E 10. (ASIIN 4.3) It is recommended to invest in the upgrade of safety features along the lines described in this report.

E 11. (ASIIN 5.1) It is recommended rewriting some of the module descriptions making still better use of Blooms Taxonomy in the process.

G Comment of the Technical Committee 09 – Chemistry (18.11.2024)

Assessment and analysis for the award of the ASIIN seal:

The Technical Committee discusses the procedure and proposes that requirements A1 be converted into a recommendation, as it is up to the university to decide whether or not to carry out tracer studies. In addition, requirements A2 and A5 are to be merged and slightly reformulated. The other c requirements and recommendations are supported without changes.

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

Degree Programme	**ASIIN seal**	**Subject-specific Label**	**Maximum duration of accreditation**
Ba Chemistry	With requirements for one year	-	30.09.2031

H Decision of the Accreditation Commission (06.12.2024)

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

The Accreditation Commission discusses the procedure especially the suggestion of TC 09 to change requirement A1 to a recommendation and to merge requirements A2 and A5. The AC agrees that it is useful to conduct tracer studies and to gather data about the graduates' occupation areas but how the university wants do this is their own decision. Therefore, the AC decides to change requirement A1 to a recommendation. The AC also decides to reword requirements A2 and A5 and to issue a recommendation with respect to the students' research and scientific writing skills.

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

Degree Program	ASIIN seal	Subject-specific Label	Maximum duration of accreditation
Ba Chemistry	With requirements for one year	-	30.09.2031

Requirements

A 1. (ASIIN 2.1) The internship system must be reformed ensuring that students engage in meaningful tasks during their internships, with improvements in quality, supervision, and reporting of the internship experience not least to achieve equivalence to the level of a Bachelor thesis.

A 2. (ASIIN 2.2) If the community service forms a compulsory part of the curriculum, it must be credited.

A 3. (ASIIN 3) Make sure that all students conduct a Bachelor graduation project and strengthen its experimental aspects.

A 4. (ASIIN 4.3) It is required investing in additional storage cabinets for toxic substances and avoid using these in early year courses.

A 5. (ASIIN 5.2) A Diploma Supplement must be automatically issued to all graduates to facilitate international recognition and mobility.

A 6. (ASIIN 6) The mechanisms by which student surveys are used and further processed must be reformed closing the feedback loops along the lines described in this report.

Recommendations

E 1. (ASIIN 2.1) The community service component should be enhanced by allowing students to work on small, discipline-related projects.

E 2. (ASIIN 2.1) It is recommended strengthening the experimental and practical aspects in spectroscopy, to support the theoretical modules. This should include all steps of the experimental techniques (sample preparation, instrumental measurements and data evaluation as well as the interpretation of spectroscopical data, also supported by computer techniques. At the end students should be challenged to write a report in a scientific way. The experts also see value in adding an elective course in the area of chemometrics allowing the students to interpret the data in a modern way.

E 3. (ASIIN 2.1) Elective courses should be grouped into coherent specialization areas to provide clearer pathways for students and align with specific professional skills. Students should be guided through this process.

E 4. (ASIIN 2.1) It is recommended establishing an internship office to manage internships, maintain a database of opportunities, and formalize processes.

E 5. (ASIIN 2.1). The Department of Chemistry should formulate and implement an Internationalization Strategy with measurable steps along the lines described in this report.

E 6. (ASIIN 2.1) Efforts should be strengthened to support student mobility through partnerships, language preparation, and potentially ERASMUS programs.

E 7. (ASIIN 2.1) It is recommended increasing the involvement of active international and industry guest lecturers to provide diverse perspectives and industry insights.

E 8. (ASIIN 2.3) It is recommended defining an official learning philosophy manifesting the principles, for which teaching and learning at the Department/University stands for.

E 9. (ASIIN 3) It is recommended using a greater variety of exam formats, also with a renewed emphasis on oral examinations, to accurately measure the achievement of the intended learning outcomes in line with a more student-centered, problem-based teaching philosophy.

E 10. (ASIIN 4.3) It is recommended to invest in the upgrade of safety features along the lines described in this report.

E 11. (ASIIN 5.1) It is recommended rewriting some of the module descriptions making still better use of Blooms Taxonomy in the process.

E 12. (ASIIN 1.1) It is recommended to conduct tracer studies to generate data on graduates' career paths and to use this data for modernizing the competence profiles and for curriculum adjustments.

E 13. (ASIIN 1.3) It is recommended to pay renewed attention of using modern literature and familiarize students with basic research and scientific writing skills early on.

Appendix: Program 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 Chemistry:

Knowledge Skills
Demonstrate knowledge and understanding of essential facts, concepts, principles and theories, perform experiments and find suitable industrial applications related to organic, inorganic, analytical and physical chemistry.
Nomenclature and use the suitable terminology of chemical compounds either by common names or systematic (IUPAC) names.
Describe the principles of quantitative and qualitative chemical analysis using conventional methods and instrumental techniques.
Intellectual Skills
Explain the nature and behaviour of chemical compounds, their classification, chemical structure, reactivity, mechanisms, physical properties, and characterizations using different techniques.
Estimate chemical data by performing calculations and derivation related to general, analytical, physical, organic and inorganic chemistry.
Practical skills
Use of laboratory equipment and standard procedures & safely.
Appreciate the importance of carrying out careful and precise measurements to generate reliable data.
Prepare and separate compounds and analyze substances.
Prepare scientific reports and make oral presentations.
Use the scientific literature effectively and demonstrating scholarship in their research.
Transferable skills
Communication skills, covering both written and oral communication.
Problem-solving skills, relating to qualitative and quantitative information, extending to situations where evaluations have to be made on the basis of limited information.

The following **curriculum** is presented:

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Study Plans - English

Major : Chemistry / Bachelor
Faculty : Arts and Sciences
Plan Hrs : 132
Min Semester : 6 Semester(s) Training : Not Found
Max Semester : 14 Semester(s) Training Hrs :
Plan Semester : 20212
Section : Science
Plan Type : Major
Edition : 13 Study Type: Morning
Thesis Type : Nothing

Category : University Requirement — Hrs : (18) Hrs

Group : Compulsory — Hrs : (18) Hrs

course	Course Name	Hrs	Prerequisite Courses	Prerequisit Hrs
9300105	Entrepreneurship & Innovation	2		
9400100	National Education	3		
9400107	Leadership & social Responsibilities	2		
9400108	Life Skills	2		
9400109	Military Science	3		
9400113	Communication Skills in Arabic 1	3	((Pre) 9401099)	
9400123	Communication Skills in English 1	3	((Pre) 9402099)	

Category : — Hrs : (3) Hrs

Group : Elective — Hrs : (3) Hrs

course	Course Name	Hrs	Prerequisite Courses	Prerequisit Hrs
9400103	Human Civilization	3		
9400104	Political Science	3		
9400114	Communication Skills in Arabic 2	3	((Pre) 9400113)	
9400124	Communication Skills in English 2	3	((Pre) 9400123)	
9400133	Jerusalem and the Palestinian Cause	3		
9700102	Human Rights	3		

Category : — Hrs : (3) Hrs

Group : Elective — Hrs : (3) Hrs

course	Course Name	Hrs	Prerequisite Courses	Prerequisit Hrs
9100101	Science & Life	3		
9200102	Development & Environment	3		
9500101	First Aid	3		
9500111	Food and Nutrition in Our Life	3		
9600104	Digital Skills	3	((Pre) 9601099)	

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Study Plans - English

Category : College Requirement Hrs : (21) Hrs

Group : Compulsory Hrs : (21) Hrs

course	Course Name	Hrs	Prerequisite Courses	Prerequisit Hrs
101101	(General Chemistry (1	3		
101102	(General Chemistry (2	3	((Pre) 101101)	
101106	(General Chemistry Lab. (1	1	((Co) 101101)	
101107	(General Chemistry Lab (2	1	((Pre) 101106)	
103101	(Calculus (1	3		
103102	(Calculus (2	3	((Pre) 103101)	
104101	(General Physics (1	3		
104102	(General Physics (2	3	((Pre) 104101)	
104106	General Physics Lab	1	((Co) 104102)	

Category : Major Requirement Hrs : (75) Hrs

Group : Compulsory Hrs : (63) Hrs

course	Course Name	Hrs	Prerequisite Courses	Prerequisit Hrs
101211	(Organic Chemistry (1	3	((Pre) 101102)	
101212	(Organic Chemistry (2	3	((Pre) 101211)	
101213	(Organic Chemistry Lab. (1	2	((Pre) 101211)	
101231	(Inorganic Chemistry (1	3	((Pre) 101102)	
101232	(Inorganic Chemistry (2	3	((Pre) 101231)	
101241	Analytical Chemistry	3	((Pre) 101102)	
101243	Analytical Chemistry Lab	1	((Pre) 101107)	
101245	Chemical Toxicology and Safety	3	((Pre) 101102)	
101311	(Organic Chemistry (3	3	((Pre) 101212)	
101312	(Organic Chemistry Lab. (2	2	((Pre) 101213)	
101313	Biochemistry	3	((Pre)& 503101 (Pre) 101212)	
101321	(Physical Chemistry (1	3	((Pre)& 103102 (Pre) 101102)	
101322	(Physical Chemistry (2	3	((Pre) 101321)	
101323	(Physical Chemistry Lab. (1	2	((Pre) 101321)	
101331	(Inorganic Chemistry (3	3	((Pre) 101232)	
101343	Instrumental Methods of Analysis	3	((Pre) 101243)	
101344	Instrumental Methods of Analysis Lab	1	((Co) 101343)	
101345	Electroanalytical Chemistry	3	((Pre) 101241)	
101346	Analysis & Synthesis of Chemical Products	2	((Pre) 101241)	
101349	Analysis & Synthesis of Chemical Products La	1	((Pre) 101346)	
101421	(Physical Chemistry (3	3	((Pre)& 103222 (Pre) 101322)	
101422	(Physical Chemistry Lab. (2	2	((Pre) 101323)	
101434	-	2		

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Study Plans - English

Category Major Requirement Hrs : (75) Hrs

Group Compulsory Hrs : (63) Hrs

course	Course Name	Hrs	Prerequisite Courses	Prerequisit Hrs
101436	-	2	((Pre) 101434)	
101445	Scientific Writing & Seminar	1		
101446	Research Project	3	((Pre) 101445)	

Group : Elective Hrs : (12) Hrs

course	Course Name	Hrs	Prerequisite Courses	Prerequisit Hrs
101333	Green Chemistry	3	((Pre) 101231)	
101401	-	3		90
101413	Heterocyclic Chemistry	3	((Pre) 101212)	
101425	Surface Chemistry & Colloids	3	((Pre) 101322)	
101435	Special Topics in Chemistry	3	((Pre) 101232)	
101441	Environmental Chemistry	3	((Pre) 101102)	
101443	Physical Organic Chemistry	3	((Pre) 101311)	
101447	Quality Control	3	((Pre) 101241)	
101450	Professional Skills in Chemistry	3		
101451	Nuclear Chemistry	3	((Pre) 101241)	
101452	Environmental Pollution	3	((Pre) 101102)	
101453	Petroleum Chemistry	3	((Pre) 101212)	
101454	(Organic Industries (1	3	((Pre) 101212)	
101455	Inorganic Industries	3	((Pre) 101232)	
101456	(Computer Applications in Chemistry(1	3	((Pre) 101321)	
101457	(Computer Applications in Chemistry(2	3	((Pre) 101321)	
101458	(Organic Industries (2	3	((Pre) 101212)	

Category : Supporting Requirement Hrs : (9) Hrs

Group : Compulsory Hrs : (9) Hrs

course	Course Name	Hrs	Prerequisite Courses	Prerequisit Hrs
103222	Differential Equations	3	((Pre) 103102)	
103231	Principles of Statistics	3	((Pre) 103101)	
503101	Biology 1	3		

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Study Plans - English

Category : General Courses Hrs : (3) Hrs

Group : Free Hrs Hrs : (3) Hrs

course	Course Name	Hrs	Prerequisite Courses	Prerequisit Hrs

Category : Complementary Courses Hrs : (9) Hrs

Group : Compulsory Hrs : (9) Hrs

course	Course Name	Hrs	Prerequisite Courses	Prerequisit Hrs
9401099	Arabic language-Intensive	3		
9402099	English language-Intensive	3		
9601099	Computer Skills-Intensive	3		

Category : Hrs : (0) Hrs

Group : Compulsory Hrs : (0) Hrs

course	Course Name	Hrs	Prerequisite Courses	Prerequisit Hrs
9101000	Community Service	0	((Pre) 9400107)	

Major : Chemistry / Bachelor
Faculty : Arts and Sciences
Plan Hrs : 132
Min Semester : 6 Semester(s) Training : Not Found
Max Semester : 14 Semester(s) Training Hrs :
Plan Semester : 20212
Section : Science
Plan Type : Major
Edition : 13 Study Type: Evening
Thesis Type : Nothing

Category : University Requirement Hrs : (18) Hrs

Group : Compulsory Hrs : (18) Hrs

course	Course Name	Hrs	Prerequisite Courses	Prerequisit Hrs
9300105	Entrepreneurship & Innovation	2		
9400100	National Education	3		
9400107	Leadership & social Responsibilities	2		

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Category University Requirement Hrs : (18) Hrs

Group Compulsory Hrs : (18) Hrs

course	Course Name	Hrs	Prerequisite Courses	Prerequisit Hrs
9400108	Life Skills	2		
9400109	Military Science	3		
9400113	Communication Skills in Arabic 1	3	((Pre) 9401099)	
9400123	Communication Skills in English 1	3	((Pre) 9402099)	

Category : Hrs : (3) Hrs

Group : Elective Hrs : (3) Hrs

course	Course Name	Hrs	Prerequisite Courses	Prerequisit Hrs
9400103	Human Civilization	3		
9400104	Political Science	3		
9400114	Communication Skills in Arabic 2	3	((Pre) 9400113)	
9400124	Communication Skills in English 2	3	((Pre) 9400123)	
9400133	Jerusalem and the Palestinian Cause	3		
9700102	Human Rights	3		

Category : Hrs : (3) Hrs

Group : Elective Hrs : (3) Hrs

course	Course Name	Hrs	Prerequisite Courses	Prerequisit Hrs
9100101	Science & Life	3		
9200102	Development & Environment	3		
9500101	First Aid	3		
9500111	Food and Nutrition in Our Life	3		
9600104	Digital Skills	3	((Pre) 9601099)	

Category : College Requirement Hrs : (21) Hrs

Group : Compulsory Hrs : (21) Hrs

course	Course Name	Hrs	Prerequisite Courses	Prerequisit Hrs
101101	(General Chemistry (1	3		
101102	(General Chemistry (2	3	((Pre) 101101)	
101106	(General Chemistry Lab. (1	1	((Co) 101101)	
101107	(General Chemistry Lab (2	1	((Pre) 101106)	
103101	(Calculus (1	3		

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Study Plans - English

Category College Requirement Hrs : (21) Hrs

Group Compulsory Hrs : (21) Hrs

course	Course Name	Hrs	Prerequisite Courses	Prerequisit Hrs
103102	(Calculus (2	3	((Pre) 103101)	
104101	(General Physics (1	3		
104102	(General Physics (2	3	((Pre) 104101)	
104106	General Physics Lab	1	((Co) 104102)	

Category : Major Requirement Hrs : (75) Hrs

Group : Compulsory Hrs : (63) Hrs

course	Course Name	Hrs	Prerequisite Courses	Prerequisit Hrs
101211	(Organic Chemistry (1	3	((Pre) 101102)	
101212	(Organic Chemistry (2	3	((Pre) 101211)	
101213	(Organic Chemistry Lab. (1	2	((Pre) 101211)	
101231	(Inorganic Chemistry (1	3	((Pre) 101102)	
101232	(Inorganic Chemistry (2	3	((Pre) 101231)	
101241	Analytical Chemistry	3	((Pre) 101102)	
101243	Analytical Chemistry Lab	1	((Pre) 101107)	
101245	Chemical Toxicology and Safety	3	((Pre) 101102)	
101311	(Organic Chemistry (3	3	((Pre) 101212)	
101312	(Organic Chemistry Lab. (2	2	((Pre) 101213)	
101313	Biochemistry	3	((Pre)& 503101 (Pre) 101212)	
101321	(Physical Chemistry (1	3	((Pre)& 103102 (Pre) 101102)	
101322	(Physical Chemistry (2	3	((Pre) 101321)	
101323	(Physical Chemistry Lab. (1	2	((Pre) 101321)	
101331	(Inorganic Chemistry (3	3	((Pre) 101232)	
101343	Instrumental Methods of Analysis	3	((Pre) 101243)	
101344	Instrumental Methods of Analysis Lab	1	((Co) 101343)	
101345	Electroanalytical Chemistry	3	((Pre) 101241)	
101346	Analysis & Synthesis of Chemical Products	2	((Pre) 101241)	
101349	Analysis & Synthesis of Chemical Products La	1	((Pre) 101346)	
101421	(Physical Chemistry (3	3	((Pre)& 103222 (Pre) 101322)	
101422	(Physical Chemistry Lab. (2	2	((Pre) 101323)	
101434	-	2		
101436	-	2	((Pre) 101434)	
101445	Scientific Writing & Seminar	1		
101446	Research Project	3	((Pre) 101445)	

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Study Plans - English

Category Major Requirement Hrs : (75) Hrs

Group : Elective Hrs : (12) Hrs

course	Course Name	Hrs	Prerequisite Courses	Prerequisit Hrs
101333	Green Chemistry	3	((Pre) 101231)	
101401	-	3		90
101413	Heterocyclic Chemistry	3	((Pre) 101212)	
101425	Surface Chemistry & Colloids	3	((Pre) 101322)	
101435	Special Topics in Chemistry	3	((Pre) 101232)	
101441	Environmental Chemistry	3	((Pre) 101102)	
101443	Physical Organic Chemistry	3	((Pre) 101311)	
101447	Quality Control	3	((Pre) 101241)	
101450	Professional Skills in Chemistry	3		
101451	Nuclear Chemistry	3	((Pre) 101241)	
101452	Environmental Pollution	3	((Pre) 101102)	
101453	Petroleum Chemistry	3	((Pre) 101212)	
101454	(Organic Industries (1	3	((Pre) 101212)	
101455	Inorganic Industries	3	((Pre) 101232)	
101456	(Computer Applications in Chemistry(1	3	((Pre) 101321)	
101457	(Computer Applications in Chemistry(2	3	((Pre) 101321)	
101458	(Organic Industries (2	3	((Pre) 101212)	

Category : Supporting Requirement Hrs : (9) Hrs

Group : Compulsory Hrs : (9) Hrs

course	Course Name	Hrs	Prerequisite Courses	Prerequisit Hrs
103222	Differential Equations	3	((Pre) 103102)	
103231	Principles of Statistics	3	((Pre) 103101)	
503101	Biology 1	3		

Category : General Courses Hrs : (3) Hrs

Group : Free Hrs Hrs : (3) Hrs

course	Course Name	Hrs	Prerequisite Courses	Prerequisit Hrs

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Study Plans - English

Category : Complementary Courses Hrs : (9) Hrs

Group : Compulsory Hrs : (9) Hrs

course	Course Name	Hrs	Prerequisite Courses	Prerequisit Hrs
9401099	Arabic language-Intensive	3		
9402099	English language-Intensive	3		
9601099	Computer Skills-Intensive	3		

Category : Hrs : (0) Hrs

Group : Compulsory Hrs : (0) Hrs

course	Course Name	Hrs	Prerequisite Courses	Prerequisit Hrs
9101000	Community Service	0	((Pre) 9400107)	

Major : Chemistry / Bachelor
Faculty : Arts and Sciences
Plan Hrs : 132
Min Semester : 6 Semester(s) Training : Not Found
Max Semester : 14 Semester(s) Training Hrs :
Plan Semester : 20212
Section : Science
Plan Type : Major
Edition : 13 Study Type: Vistor
Thesis Type : Nothing

Category : University Requirement Hrs : (18) Hrs

Group : Compulsory Hrs : (18) Hrs

course	Course Name	Hrs	Prerequisite Courses	Prerequisit Hrs
9300105	Entrepreneurship & Innovation	2		
9400100	National Education	3		
9400107	Leadership & social Responsibilities	2		
9400108	Life Skills	2		
9400109	Military Science	3		
9400113	Communication Skills in Arabic 1	3	((Pre) 9401099)	
9400123	Communication Skills in English 1	3	((Pre) 9402099)	

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Study Plans - English

Category : Hrs : (3) Hrs

Group : Elective Hrs : (3) Hrs

course	Course Name	Hrs	Prerequisite Courses	Prerequisit Hrs
9400103	Human Civilization	3		
9400104	Political Science	3		
9400114	Communication Skills in Arabic 2	3	((Pre) 9400113)	
9400124	Communication Skills in English 2	3	((Pre) 9400123)	
9400133	Jerusalem and the Palestinian Cause	3		
9700102	Human Rights	3		

Category : Hrs : (3) Hrs

Group : Elective Hrs : (3) Hrs

course	Course Name	Hrs	Prerequisite Courses	Prerequisit Hrs
9100101	Science & Life	3		
9200102	Development & Environment	3		
9500101	First Aid	3		
9500111	Food and Nutrition in Our Life	3		
9600104	Digital Skills	3	((Pre) 9601099)	

Category : College Requirement Hrs : (21) Hrs

Group : Compulsory Hrs : (21) Hrs

course	Course Name	Hrs	Prerequisite Courses	Prerequisit Hrs
101101	(General Chemistry (1	3		
101102	(General Chemistry (2	3	((Pre) 101101)	
101106	(General Chemistry Lab. (1	1	((Co) 101101)	
101107	(General Chemistry Lab (2	1	((Pre) 101106)	
103101	(Calculus (1	3		
103102	(Calculus (2	3	((Pre) 103101)	
104101	(General Physics (1	3		
104102	(General Physics (2	3	((Pre) 104101)	
104106	General Physics Lab	1	((Co) 104102)	

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Study Plans - English

Category : Major Requirement — Hrs : (75) Hrs

Group : Compulsory — Hrs : (63) Hrs

course	Course Name	Hrs	Prerequisite Courses	Prerequisit Hrs
101211	(Organic Chemistry (1	3	((Pre) 101102)	
101212	(Organic Chemistry (2	3	((Pre) 101211)	
101213	(Organic Chemistry Lab. (1	2	((Pre) 101211)	
101231	(Inorganic Chemistry (1	3	((Pre) 101102)	
101232	(Inorganic Chemistry (2	3	((Pre) 101231)	
101241	Analytical Chemistry	3	((Pre) 101102)	
101243	Analytical Chemistry Lab	1	((Pre) 101107)	
101245	Chemical Toxicology and Safety	3	((Pre) 101102)	
101311	(Organic Chemistry (3	3	((Pre) 101212)	
101312	(Organic Chemistry Lab. (2	2	((Pre) 101213)	
101313	Biochemistry	3	((Pre)& 503101 (Pre) 101212)	
101321	(Physical Chemistry (1	3	((Pre)& 103102 (Pre) 101102)	
101322	(Physical Chemistry (2	3	((Pre) 101321)	
101323	(Physical Chemistry Lab. (1	2	((Pre) 101321)	
101331	(Inorganic Chemistry (3	3	((Pre) 101232)	
101343	Instrumental Methods of Analysis	3	((Pre) 101243)	
101344	Instrumental Methods of Analysis Lab	1	((Co) 101343)	
101345	Electroanalytical Chemistry	3	((Pre) 101241)	
101346	Analysis & Synthesis of Chemical Products	2	((Pre) 101241)	
101349	Analysis & Synthesis of Chemical Products La	1	((Pre) 101346)	
101421	(Physical Chemistry (3	3	((Pre)& 103222 (Pre) 101322)	
101422	(Physical Chemistry Lab. (2	2	((Pre) 101323)	
101434	-	2		
101436	-	2	((Pre) 101434)	
101445	Scientific Writing & Seminar	1		
101446	Research Project	3	((Pre) 101445)	

Group : Elective — Hrs : (12) Hrs

course	Course Name	Hrs	Prerequisite Courses	Prerequisit Hrs
101333	Green Chemistry	3	((Pre) 101231)	
101401	-	3		90
101413	Heterocyclic Chemistry	3	((Pre) 101212)	
101425	Surface Chemistry & Colloids	3	((Pre) 101322)	
101435	Special Topics in Chemistry	3	((Pre) 101232)	
101441	Environmental Chemistry	3	((Pre) 101102)	
101443	Physical Organic Chemistry	3	((Pre) 101311)	
101447	Quality Control	3	((Pre) 101241)	

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Study Plans - English

Category Major Requirement Hrs : (75) Hrs

Group Elective Hrs : (12) Hrs

course	Course Name	Hrs	Prerequisite Courses	Prerequisit Hrs
101450	Professional Skills in Chemistry	3		
101451	Nuclear Chemistry	3	((Pre) 101241)	
101452	Environmental Pollution	3	((Pre) 101102)	
101453	Petroleum Chemistry	3	((Pre) 101212)	
101454	(Organic Industries (1	3	((Pre) 101212)	
101455	Inorganic Industries	3	((Pre) 101232)	
101456	(Computer Applications in Chemistry(1	3	((Pre) 101321)	
101457	(Computer Applications in Chemistry(2	3	((Pre) 101321)	
101458	(Organic Industries (2	3	((Pre) 101212)	

Category : Supporting Requirement Hrs : (9) Hrs

Group : Compulsory Hrs : (9) Hrs

course	Course Name	Hrs	Prerequisite Courses	Prerequisit Hrs
103222	Differential Equations	3	((Pre) 103102)	
103231	Principles of Statistics	3	((Pre) 103101)	
503101	Biology 1	3		

Category : General Courses Hrs : (3) Hrs

Group : Free Hrs Hrs : (3) Hrs

course	Course Name	Hrs	Prerequisite Courses	Prerequisit Hrs

Category : Complementary Courses Hrs : (9) Hrs

Group : Compulsory Hrs : (9) Hrs

course	Course Name	Hrs	Prerequisite Courses	Prerequisit Hrs
9401099	Arabic language-Intensive	3		
9402099	English language-Intensive	3		
9601099	Computer Skills-Intensive	3		

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Study Plans - English

Category : Hrs : (0) Hrs

Group : Compulsory Hrs : (0) Hrs

course	Course Name	Hrs	Prerequisite Courses	Prerequisit Hrs
9101000	Community Service	0	((Pre) 9400107)	

Prohibited Courses

Course	Course Name	Hrs	
302110	Mathematics For Management	3	
601101	Computer Skills (1)	3	
406211	Natural Sciences	3	
312110	Mathematics For Business	3	
302110	Mathematics For Management	3	
601101	Computer Skills (1)	3	
406211	Natural Sciences	3	
312110	Mathematics For Business	3	
302110	Mathematics For Management	3	
601101	Computer Skills (1)	3	
406211	Natural Sciences	3	
312110	Mathematics For Business	3	

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