هيئة جودة التعليم والتدريب
Education & Training Quality Authority
Kingdom of Bahrain - مملكة البحرين

Directorate of Higher Education Reviews

Programme Review Report

University of Bahrain

College of Science

Bachelor of Science in Chemistry

Kingdom of Bahrain

Site Visit Date: 11 – 14 December 2022

HA072-C3-R072

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Acronyms

APR	Academic Programme Review
BQA	Education & Training Quality Authority
BSc	Bachelor of Science
CGPA	Cumulative Grade Point Average
CILO	Course Intended Learning Outcome
CoS	College of Science
CSC	The Canadian Society for Chemistry
DHR	Directorate of Higher Education Reviews
HEC	Higher Education Council
HEI	Higher Education Institution
HoD	Head of Department
ILO	Intended Learning Outcome
LMS	Learning Management System
NQF	National Qualifications Framework
OHS	Occupational Health and Safety
PAC	Programme Advisory Committee
PEO	Programme Educational Objective
PILO	Programme Intended Learning Outcome
QAAC	Quality Assurance and Accreditation Center
QAC	Quality Assurance Committee
SAC	Student Advisory Committee
SER	Self-Evaluation Report
SIS	Student Information System
UILO	University Intended Learning Outcome
UoB	University of Bahrain

I. Introduction

In keeping with its mandate, the Education & Training Quality Authority (BQA), through the Directorate of Higher Education Reviews (DHR), carries out two types of reviews that are complementary. These are: Institutional Reviews, where the whole institution is assessed; and the Academic Programme Reviews (APRs), where the quality of teaching, learning and academic standards are assessed in academic programmes within various colleges according to specific standards and indicators as reflected in its Framework.

Following the revision of the APR Framework at the end of Cycle 1 in accordance with the BQA procedure, the revised APR Framework (Cycle 2) was endorsed as per the Council of Ministers' Resolution No.17 of 2019. Thereof, in the academic year (2019-2020), the DHR commenced its second cycle of programme reviews.

The Cycle 2 APR Review Framework is based on four main Standards and 21 Indicators, which forms the basis the APR Reports of the Higher Education Institutions (HEIs).

The **four** standards that are used to determine whether or not a programme meets international standards are as follows:

Standard 1: **The Learning Programme**

Standard 2: **Efficiency of the Programme**

Standard 3: **Academic Standards of Students and Graduates**

Standard 4: **Effectiveness of Quality Management and Assurance**

The Review Panel (hereinafter referred to as 'the Panel') decides whether each indicator, within a standard, is 'addressed', 'partially addressed' or 'not addressed'. From these judgments on the indicators, the Panel additionally determines whether each of the four standards is 'Satisfied' or 'Not Satisfied', thus leading to the Programme's overall judgment, as shown in Table 1 below.

Table 1: Criteria for Judgements

Criteria	Judgement
All four Standards are satisfied	Confidence
Two or three Standards are satisfied, including Standard 1	Limited Confidence
One or no Standard is satisfied	No Confidence
All cases where **Standard 1** is not satisfied	

The APR Review Report begins with providing the profile of the Programme under review, followed by a brief outline of the judgment received for each indicator, standard, and the overall judgement.

The main section of the report is an analysis of the status of the programme, at the time of its actual review, in relation to the review standards, indicators and their underlying expectations.

The report ends with a Conclusion and a list of Appreciations and Recommendations.

II. The Programme's Profile

Institution Name*	University of Bahrain
College/ Department*	College of Science/ Department of Chemistry
Programme/ Qualification Title*	Bachelor of Science in Chemistry
Qualification Approval Number	University Council Decision No. (323) of 1998
NQF Level	8
Validity Period on NQF	5 years from the placement date
Number of Units*	42
NQF Credit	571
Programme Aims*	1. The ability to understand basic concepts in chemistry. 2. The ability to do calculations with chemical formula and equations in terms of moles and Avogadro's number. 3. The ability to use the periodic table, identify types of compounds and naming them and use the electron level arrangement of elements to explain the periodic trends. 4. The ability to understand the principles in writing chemical equations. 5. The ability to use stoichiometry in gaseous and aqueous molar quantities. 6. The ability to identify different types of chemical reactions. 7. The ability to describe the energy and heat. 8. Relate the chemistry concepts / principals that have learned to real life issues especially in the field of health and environment.
Programme Intended Learning Outcomes*	a) Master a broad set of chemical knowledge concerning the fundamentals in the basic areas of the discipline (organic, inorganic, analytical and physical). b) Use standard laboratory equipment, modern instrumentation and techniques to carry out experiments. c) Acquire, analyze and interpret experimental data and reach valid scientific conclusions.

	d) Use computers in data acquisition and processing and use available software as tool in data analysis. e) Acquire the basic skills of scientific research. f) Employ modern library search tools to retrieve scientific information related to chemistry. g) Communicate the concepts and results of their theoretical and experimental work through effective writing and oral communication skills. h) Act with integrity and good ethics. i) Acquire a broad set of scientific and general knowledge. j) Acquire self-learning skills to ensure lifelong learning.

* Mandatory fields

III. Judgment Summary

The Programme's Judgment: Confidence

Standard/ Indicator	Title	Judgement
Standard 1	**The Learning Programme**	**Satisfied**
Indicator 1.1	The Academic Planning Framework	Addressed
Indicator 1.2	Graduate Attributes & Intended Learning Outcomes	Addressed
Indicator 1.3	The Curriculum Content	Addressed
Indicator 1.4	Teaching and Learning	Addressed
Indicator 1.5	Assessment Arrangements	Addressed
Standard 2	**Efficiency of the Programme**	**Satisfied**
Indicator 2.1	Admitted Students	Addressed
Indicator 2.2	Academic Staff	Partially addressed
Indicator 2.3	Physical and Material Resources	Addressed
Indicator 2.4	Management Information Systems	Addressed
Indicator 2.5	Student Support	Addressed
Standard 3	**Academic Standards of Students and Graduates**	**Satisfied**
Indicator 3.1	Efficiency of the Assessment	Addressed
Indicator 3.2	Academic Integrity	Addressed
Indicator 3.3	Internal and External Moderation of Assessment	Partially Addressed
Indicator 3.4	Work-based Learning	Addressed

Standard/ Indicator	Title	Judgement
Indicator 3.5	Capstone Project or Thesis/Dissertation Component	Addressed
Indicator 3.6	Achievements of the Graduates	Addressed
Standard 4	**Effectiveness of Quality Management and Assurance**	**Satisfied**
Indicator 4.1	Quality Assurance Management	Addressed
Indicator 4.2	Programme Management and Leadership	Addressed
Indicator 4.3	Annual and Periodic Review of the Programme	Partially addressed
Indicator 4.4	Benchmarking and Surveys	Partially addressed
Indicator 4.5	Relevance to Labour Market and Societal Needs	Addressed

IV. Standards and Indicators

Standard 1

The Learning Programme

The programme demonstrates fitness for purpose in terms of mission, relevance, curriculum, pedagogy, intended learning outcomes and assessment.

Indicator 1.1: The Academic Planning Framework

There is a clear academic planning framework for the programme, reflected in clear aims which relate to the mission and strategic goals of the institution and the college.

Judgment: ***Addressed***

- The Panel notes the University's governance framework relating to the academic endeavor. These include the Study and Examination Regulations, Quality Assurance and Enhancement Policy and the Teaching & Learning Policy.

- The Department of Chemistry at the College of Science (CoS) of the University of Bahrain (UoB) offers the Bachelor in Chemistry since the Academic Year 1982, as indicated in the Self-Evaluation Report (SER). The programme has minor tracks in Biology, Physics, Mathematics, Statistics, Computer Science, and Astronomy. This is clearly described in the accreditation documentation and the website.

- The content of each qualification tracks is clearly delineated. The study plan aligns well with degrees of a similar focus in other international and regional universities. During the virtual interviews, the Panel was informed that the communication between the Head of Department (HoD) and Programme Advisory Committee (PAC) members resulted in the current study plan. However, the Panel notes that the Department is in the process of creating a new study plan in response to feedback from the Canadian Society for Chemistry (CSC) and their perception of the needs of Bahrain to ensure that the programme is fit for purpose.

- The Programme Educational Objectives (PEOs) reflect the aims of the programme and include a good foundation in chemistry and in ethical practice. The Panel notes that the PEOs are clearly stated and are aligned with the University Intended Learning Outcomes (UILOs) and the Programme Intended Learning Outcomes (PILOs). Moreover, the PEOs are mapped to the mission of the College and UoB. However, the Panel notes that the PEOs are not revised on a regular basis. Consequently, the Panel advises the programme team to revise the PEOs when conducting the periodic reviews of the programme.

- The Panel notes that in 2019-2020, the programme was validated by the NQF and was placed on Level 8 of the National Qualifications Framework (NQF) with 571 NQF credits. All in all, the Panel is satisfied that the academic planning framework is aligned with the NQF level 8 requirements and that the chemistry courses offered by the Department are aligned with international standards.

Indicator 1.2: Graduate Attributes & Intended Learning Outcomes

Graduate attributes are clearly stated in terms of intended learning outcomes for the programme and for each course and these are appropriate for the level of the degree and meet the NQF requirements.

Judgment: ***Addressed***

- There are six generic graduate attributes known as UILOs. The Panel notes that the PILOs are well aligned with the UILOs and clearly reflect the attributes within a chemistry degree as known internationally. The Panel is satisfied that the Department has aligned their PILOs with the PEOs and that these map onto the UILOs.

- In accordance with Quality Assurance and Enhancement Policy the PILOs ought to be clearly stated in each course specification. These PILOs are commensurate with the learning outcomes one would expect of a Bachelor's degree in chemistry. The PILOs meet the requirements of NQF level 8. As is necessary in a vertical knowledge structure such as chemistry each year builds on the knowledge foundation of the year before in a manner that is coherent and well aligned. The practical components of the courses through which application and communication of knowledge is most easily demonstrated are well aligned with course content. The Panel notes that the courses are well structured and both alumni and employers are satisfied with both the knowledge content and soft skills of graduates.

- Despite the above mentioned, the Panel notes that the PILOs are not well aligned with Course Intended Learning Outcomes (CILOs). There is a mapping of PEOs to PILOs to CILOs as per the provided evidence. However, in some courses these are specified in divergent ways across the courses. PILO (i), for example, does not appear in any of the courses. PILO (f) is appropriately claimed in the 'Organic Chemistry III' (Chem 421) course, but other than this only appears in the 'General Chemistry I' (Chem 101) course and then is applied exclusively to the practical aspects. The inconsistency in the filling out of section 18 on the syllabus forms indicates that there is little understanding of the CILOs across the Department. Consequently, the Panel recommends that the College should revise the mapping of the CILOs to PILOs. The Panel also advises the College to conduct a workshop for all its staff to discuss the mapping of CILOs in the courses. Once common

understanding has been reached, the staff can then continue to have their own discussions on a semester basis to determine CILOs for the formal tests and examinations.

Indicator 1.3: The Curriculum Content

The curriculum is organised to provide academic progression of learning complexity guided by the NQF levels and credits, and it illustrates a balance between knowledge and skills, as well as theory and practice, and meets the norms and standards of the particular academic discipline.

Judgment: ***Addressed***

- The study plan for the programme is set out clearly. For each course the number of credits is specified with a suitable workload for the student during which (lecture and/or practical) is clearly stated. Moreover, the pre-requisite for each course is appropriate.

- The Department has been awarded an accreditation certificate by CSC in 2022. The accreditation period is for five years. On the basis of feedback given in the accreditation process and in conjunction with of the PAC which meets regularly the Department is in the process of developing a new study plan. This plan includes more elective courses such as courses on nanotechnology and medicinal chemistry and it is still in the phase of the first draft.

- The structure of each chemistry course comprises components of theory and practical. In each course there is evidence to show that effort is made to ensure that there is an acceptable balance between skills and knowledge and theory and practice (See Standard 3 for more detailed analysis). The Department also has a Curriculum Committee, which meets regularly so that issues such as repetition of content between modules and coherency of progression of modules is retained and even to discuss if minor changes are made within a module. The content of each course builds from year to year and moves to greater depth in the advanced courses and this is in line with international practices. The Panel is satisfied that the curriculum content is fit for purpose for the teaching of chemistry.

- Textbooks and other teaching materials are all aligned with international standards and are appropriate for the level and focus of the courses. The Department recently introduced a new textbook for their first-year general chemistry courses. This textbook comes with substantial online resources for students and staff.

Indicator 1.4: Teaching and Learning

The principles and methods used for teaching in the programme support the attainment of programme aims and intended learning outcomes.

Judgment: ***Addressed***

- The UoB teaching and learning policy is comprehensive. It covers curricula design, teaching strategies, learning environment and assessments. A range of teaching approaches are endorsed which favour an interactive learning environment which is aimed at developing the students' self-efficacy. The combination of the teaching and learning policy and the outcomes-based assessment policy support lifelong learning through a comprehensive description of assessment formats. The teaching and learning methods stipulated in the academic programme documents show the alignment of the programme specifications and the teaching and learning policy. The Panel is satisfied that the teaching and learning environment is fit for purpose and aligned with the teaching and learning policy of UoB.

- The teaching and learning policy includes the integration of technology in the teaching strategies where applicable. Evidence of e-leaning is given in the samples of some of the course files. During the virtual visit, the Panel was shown the Student Information System (SIS) and examples of course sites on Blackboard and MS Teams. In addition, the Department makes use of ALEKS for the introductory chemistry courses. ALEKS is an e-learning platform associated with the textbook used for these courses. The Panel is satisfied that e-learning is part of the programme.

Indicator 1.5: Assessment Arrangements

Suitable assessment arrangements, which include policies and procedures for assessing students' achievements, are in place and are known to all relevant stakeholders.

Judgment: ***Addressed***

- UoB has a set of policies pertaining to assessments. One of the major policies in this regard is the Regulations of Study and Examination document which describes in detail the university wide outcomes-based assessment process; and presents the essence of clear criteria for marking along with clear instructions on feedback. In the interviews, it was clear that the regulations are known to both students and staff.

- The moderation of assessment policy presents clear regulations on internal and external moderation. From interviews, the Panel learnt that internal moderation (pre-post) is being utilized to ensure the effectiveness of assessments whereas external moderation is conducted for selected courses according to a rolling plan. Furthermore, students can appeal the mark given for any assessment as per the provided document. Issues of academic misconduct are clearly stipulated in the Guide to Students Rights and Duties and students are being inducted about it during the induction period. Interviews with students, alumni and faculty members confirmed that they were aware of the misconduct

regulations. The Panel notes that students are aware of the procedure of appeal and this was confirmed during interviews. The Panel also notes that formative and summative assessments are conducted as per the provided evidence. The Panel is satisfied that all procedures necessary to ensure fair assessments are in place.

Standard 2

Efficiency of the Programme

The programme is efficient in terms of the admitted students, the use of available resources - staffing, infrastructure and student support.

Indicator 2.1: Admitted Students

There are clear admission requirements, which are appropriate for the level and type of the programme, ensuring equal opportunities for both genders, and the profile of admitted students matches the programme aims and available resources.

Judgment: ***Addressed***

- The Panel notes that the admission information published on the UoB website, CoB booklet, the Study and Examination Policy and the admission information stated in the SER are inconsistent. The UoB website states under the admission general requirements that admission requires a secondary school certificate or equivalent with a minimum grade of 70% and for students with disability 66.6%. The CoS booklet, the Study and Examination Policy and the admission information stated in the SER shows no special treatment for students with disability and it requires a minimum Cumulative Grade Point Average (CGPA) of 70% from all students , also UoB website and the admission information in the SER require that the secondary school certificate or its equivalent to be obtained within maximum one year of admission, whereas the CoS booklet and the study and examination policy require a secondary school certificate or equivalent to be obtained within a maximum of two years of admission. Consequently, the Panel recommends that the College should ensure that the admission policy is regularly revised and that published admission information is consistent and accurate.

- The admission requirements as mentioned in the SER are appropriate for the Bachelor of Science (BSc) programme level and in line with the local and international academic standards. Admission is based on several criteria with different weightage points (60% for secondary school score, 30% English test score and 10% interview score).

- The SER states that students with marks less than CGPA 80% are required to attend English orientation programme and students with CGPA between 80-90% can be exempted from the orientation programme by passing the English test while the ones with CGPA 90% and above are exempted from the English orientation programme. The Panel was informed during the interviews that students with high score in TOFEL or ILETS can be exempted from the English orientation programme.

- The SER and the Study and Exam Regulations provide a clear regulation for applicants transferring from other programmes at UoB or from other universities to the programme as per Higher Education Council (HEC) regulations.

Indicator 2.2: Academic Staff

There are clear procedures for the recruitment, induction, appraisal, promotion, and professional development of academic staff, which ensure that staff members are fit-for-purpose and that help in staff retention.

Judgment: ***Partially Addressed***

- The Chemistry Department apply UoB's academic and administrative bylaws, regulations, and policies in the recruitment, appraisal, promotion, and professional development of academic staff. The SER describes a multistep process for faculty recruitment. The conducted interviews confirmed the recruiting process which ends with the University Council approval.

- New faculty members attend an induction week to orient them about the university and college rules and regulations, and the quality assurance practices. This was confirmed during the interviews. With respect to staff evaluations, the Department uses the appraisal system that is integrated with the annual appraisal system of the Civil Service Bureau, and a detailed rubric is used with clear appraisal criteria.

- The Department follows UoB's Academic and Administrative bylaws with respect to staff's promotion. One faculty member applied for promotion to Associate Professor in 2022 as clarified during interviews.

- UoB website/ Deanship of Graduate Studies & Scientific Research page contains clear policies and procedures regarding research funding, contracts, and publication rewards. It was noted that the chemistry faculty members participate in research and scholar activities, and there is a significant progress in the number of publications through 2017-2021.

- The current number of academic staff in the B.Sc. in Chemistry programme is 16; one full Professor, eight Associate Professors, seven Assistant Professors, one Lecturer, one Instructor and four Teaching Assistants; four of the faculty members specialized in physical chemistry, four in analytical chemistry, four in inorganic chemistry and four in organic chemistry. There is a diversity of academic staff qualifications covering the basic branches in chemistry. Regulations state that a faculty member works for a maximum of 40 hours per week which include 12 to 15 credit hours of teaching for PhD holders and 15 to 18 credit hours for non-Ph.D holders, the remaining work time is used for research, participation in committees and training programmes, advising students and community

activities. However, the Panel notes that the real academic load is very high for most of the faculty members and especially for part-time faculty members and the Panel is of the view that the current number of academic staff is less than the necessary for the Department to function properly as the Department caters for the need of other colleges at UoB in addition to offering the service course. Consequently, the Panel recommends that the College should expedite the recruitment of new faculty members from different disciplines of chemistry in order to smoothly accommodate the needs of other departments in the College.

Indicator 2.3: Physical and Material Resources

Physical and material resources are adequate in number, space, style and equipment; these include classrooms, teaching halls, laboratories and other study spaces; Information Technology facilities, library and learning resources.

Judgment: ***Addressed***

- The CoS has 21 classrooms equipped with a PC, a multimedia projector and a smart board connected to the internet. Each faculty member has a separate and well-equipped office. The Panel notes that the graduating students agree that classroom facilities are adequate for instruction as indicated in one of the surveys. The Department has 12 practical laboratories: two for physical chemistry, two for analytical chemistry, two for organic chemistry, two for inorganic chemistry, four for general chemistry, three instrument laboratories and one central laboratory equipped with safety equipment and fume cupboards, two central stores, equipment store, solid material store and glass apparatus store, in addition to six research laboratories as per the conducted physical tour to the CoS. There is a reasonable number of scientific instruments in the laboratories. However, the Panel notes that the available instruments are not maintained on a regular basis and some important instruments like NMR 400 Hz and HPLC are not working for some time. Therefore, the Panel recommends that the College should develop a mechanism to ensure that the laboratories are maintained on a regular basis.

- The Department has one computer laboratory and there is a wireless network available throughout the CoS buildings. Each faculty member and student are provided with an email account on the university domain, which could be used to login to the university electronic services such as SIS, Blackboard, MS Teams, advising system, registration system and IT technical support. The Panel notes that 72.8% of the graduating students perceived the computer facilities to be adequate, as indicated in one of the surveys.

- CoS has its own library with 21,818 books, 49,249 eBooks and 8,250 e-journals. It is linked to Sirsi-Dynix library Management system EBSCO Discovery Portal, Furthermore, UoB's main library provides access to 150,000 e-books and 27,000 e-journals from several data

bases like Springer, Elsevier, ACS, Science direct, Cambridge University press, Taylor & Francis, Ebrary and more. The Exit survey shows that 78.3% of the graduating students agreed that the library facilities (e.g., computers, electronic databases, periodicals) are adequate to support the learning activities.

- The Department is housed in a three-floor building with sufficient exits for each floor and there is enough number of fire extinguishers of different types in addition to first aid kits. Laboratories are equipped with safety equipment such as safety showers, eyewash, fume cupboards and fire extinguishers of different types as noticed during the physical tour. The Panel was able to verify the safety equipment and layout of the laboratories for the images obtained from the site visit. The College Occupational Health and Safety (OHS) Committee has issued a comprehensive OHS booklet which was approved by the University Council. The Dean and OHS Committee monitor the application of OHS standards at the college level whereas the University coordinates with the General Directorate of Civil Defence to lecture staff and students about safety standards and also conducts trial evacuation emergency to orient staff and students on how to behave in a disaster. The Panel is satisfied that there are reasonable arrangements to ensure the safety of students and staff on campus.

Indicator 2.4: Management Information Systems

There are functioning management information and tracking systems that support the decision-making processes and evaluate the utilisation of laboratories, e-learning and e-resources, along with policies and procedures that ensure security of learners' records and accuracy of results.

Judgment: ***Addressed***

- As mentioned earlier, the Department makes use of ALEKS for the introductory chemistry courses which is an e-learning platform associated with the textbook used for these courses. In addition to using Blackboard, the SIS is used comprehensively across all programmes at UoB including the B.Sc. in Chemistry programme. The SIS database supports administrators and faculty members to take informed decisions by providing a platform to monitor, control and track various aspects of the B.Sc. in Chemistry programme and its students, which include student's information, academic data, registered courses, attendance and much more.

- The Panel was provided with supporting evidence clearly showing that the generated data of SIS has been utilized to inform and support decision making process related to laboratories and e-learning.

- The SIS is used for course evaluation, where students access SIS to evaluate their courses. The course evaluation is used by faculty members for course improvement and by HoD

for faculty appraisal and renewal of contracts. Also, the SIS is used to approve grades, academic advising and obtaining statistics for quality assurance purposes. Student grades are entered to SIS by faculty members, cross-checked with course coordinators, and later overviewed by the HoD to ensure accuracy.

- The access to students' records on SIS is limited to the HoD, who has full access, and to the academic advisors, who have access to their assigned advisees only. The SIS can be accessed only by signing in with UoB credentials and the IT Department can track any change. During the physical tour, the IT team described three layers of security for the academic records including antivirus, network security and other technologies. However, the Panel suggests the use of One-Time Password (OTP) as an additional security measure for the access of student academic records.

- From interviews, the Panel learnt that the Deanship of Admissions and Registration sends the Final Graduation Approval Form, which contains student Academic Transcript generated *via* SIS to be approved by the student advisor and by the HoD. Staff and graduates interviewed indicated that the certificates and transcripts are issued in a timely manner shortly after completing graduation requirements.

Indicator 2.5: Student Support

There is appropriate student support available in terms of guidance, and care for students including students with special needs, newly admitted and transferred students, and students at risk of academic failure.

Judgment: ***Addressed***

- The Panel finds that UoB provides reasonable physical and virtual resources, including well-equipped classrooms, libraries, laboratories and appropriate e-learning platforms such as Blackboard and MS Teams in addition to e-mail on university domain and access to the SIS system. These services are regularly assessed to be improved in line with students' needs.

- The Chemistry Department currently employs five laboratory technicians and three demonstrators to assist students during laboratory time. The Deanship of Students Affair provides social, behavioral and psychological guidance to students. The library offers orientation programmes to educate newly admitted students on library resources.

- The Deanship of Students Affair conducts an Induction Day to orient students to UoB rules and regulations and familiarize students with their rights and duties. The CoS also provides its own induction day. The same induction procedure is offered to transferred students. The Deanship of Students Affairs conducts an annual survey to assess the Induction Day which includes newly admitted students and their parents. The Exit survey

shows that 76% of the graduating students indicated their satisfaction with the induction they received.

- From interviews, the Panel was informed that every student at the start of the student's enrollment at the University is assigned an Academic Advisor who is responsible for offering personalized support to advisees. Students attend advising meetings with their assigned Academic Advisors to help them determine educational goals, discussion of a study plan, grades, and progress. Advising notes and comments are entered into the SIS for each advisor-student meeting. Exit survey shows that only 55.1% attempted to visit their advisor at least once every semester and 65.6% of the graduating students indicated that they received excellent advising within their academic programme, 71.3% received a prompt response from their advisor, 70.1% indicates that their advisor was knowledgeable about curriculum plan requirements and 73.0% sees that the academic advisor was interested in helping them. Students are satisfied with the provided academic advising, however only 55.1% of students attended the advising meetings regularly. Therefore, the Panel recommends that the College should enhance the advising process and to ensure that students attend the advising meetings regularly.

- The SER did not provide information about career guidance services and support to help students prepare for their careers. The Panel learnt from interviews that the UoB Career Counseling Office provides the required support for the students to achieve their career goals and equips them with the necessary skills to enter the labour force.

- UoB provides equal and unbiassed opportunities for students of both genders. The Deanship of Students Affairs in coordination with the Academic Advisors provide students with special needs with numerous services and facilities, which include specialized transportation, assigning volunteers to assist them and also extended examination time to compensate the loss of speed in writing answers. The CoS keeps a complete record of its students with special needs, containing their names, type of disability and its severity, their department, their current registered courses, e-mails and phone numbers, it also took actions to support those students. The Panel appreciates the arrangements taken by the College to support students with special needs.

- From interviews, the Panel learnt that the Academic Advisor identifies students at-risk through SIS and follows their progress in coordination with the faculty member teaching the course. Furthermore, the Student Advisory Committee (SAC) supports students at-risk by providing examination preparation workshops.

Standard 3

Academic Standards of Students and Graduates

The students and graduates of the programme meet academic standards that are compatible with equivalent programmes in Bahrain, regionally and internationally.

Indicator 3.1: Efficiency of the Assessment

The assessment is effective and aligned with learning outcomes, to ensure attainment of the graduate attributes and academic standards of the programme.

Judgment: ***Addressed***

- All courses have a variety of assessment approaches, which are outlined in detail in the course syllabus forms and indicate the percentage weighting of each mode of assessment. In all courses the final examination counts 40% in line with the university's policy. It was noted that the assessments of the courses covered written examinations and tests, assignments, projects and oral presentations; all of them escalate in complexity in the progressive semesters in order to be aligned with the overall PILOs. Furthermore, evidence was provided that students skills are gradually developed, and this is assessed *via* practical reports, case studies and oral presentations.

- There are several mechanisms by which the assessments are aligned with the CILOs in order to ensure the academic standards for the institution are maintained. For each course there is a comprehensive evaluation report provided by the Quality Assurance and Accreditation Center (QAAC) during which the instructor is required to map each of the assessments to the CILOs and PILOs. The QAAC report includes all forms of assessment within the course including the various practical and the form also provides for the identification of areas of deficiency by the students and suggested remedial actions for the following year. Evidence of the QAAC reports was provided to the Panel as well as an example where deficits were reported, and remedial actions were noted. During interviews, the faculty provided some examples of the development of soft skills like laboratory skills which are embedded within the programme outcomes and objectives.

- The University Study and Exam Regulations along with the Quality Assurance Committee (QAC) within the College, provide an overarching body for the monitoring and implementation of the quality of the programme which includes assessment. The Department also monitors the overall assessment and improvements for all courses within the BSc in Chemistry programme through the annual self-evaluation report. This report provides a holistic view of the progress made in monitoring the achievements of the courses as well as that of the exiting graduates.

Indicator 3.2: Academic Integrity

Academic integrity is ensured through the consistent implementation of relevant policies and procedures that deter plagiarism and other forms of academic misconduct (e.g., cheating, forging of results, and commissioning others to do the work).

Judgment: ***Addressed***

- The Panel observed that UoB has well-developed and comprehensive policies and procedures to address issues surrounding academic integrity in terms of cheating, plagiarism and absenteeism. These include the Anti-plagiarism Policy & Student Rights, Academic Administration Laws, and the Study and Exam regulations. These policies and procedures are available to staff and students *via* the Learning Management System (LMS) as well as on the UoB's official website which was confirmed during interviews. The institution also has a comprehensive set of student rights and responsibilities which underpin the overall academic integrity of the institution.

- Evidence was provided indicating the procedures followed in order to detect possible instances of copying or plagiarism using the SafeAssign tool which also allows students to obtain feedback on their assignments and make improvements to remove possible plagiarism, noting that a threshold of 25% has been set. It is noted in the SER that all students are made aware of the plagiarism policy during the induction period. This was confirmed by the Panel during the conducted interviews with both the faculty and the students. The Panel also noted posters in the laboratories relating to plagiarism.

- The Chemistry Department has in place mechanisms in order to allocate staff to perform invigilation duties during the summative assessments. These measures are in place to act as a deterrent and uphold academic integrity. It is stated in the SER that if instances of cheating are detected, UoB's procedures are followed. This process would be initiated by the HoD. During the COVID-19 pandemic, it was noted that invigilators were assigned for the online assessment to monitor the process and that an electronic proctoring software (Lockdown browser) was utilized in order to minimize the possibility of cheating and all students were expected to keep the video feeds open during the assessment period.

- The Panel notes that the policies do articulate the appropriate procedures that are required to follow in instances where plagiarism is detected and during the interviews, faculty members were able to explain to the Panel the processes to follow should cases of plagiarism be detected. The Panel was also provided with evidence to support that the Department was indeed practicing such procedures where students were required to submit assignments for similarity indexing. The Panel also learnt that no cases of plagiarism by the students had been detected to date. Cases of other forms of academic misconduct are recorded and appropriate actions are taken.

Indicator 3.3: Internal and External Moderation of Assessment

There are mechanisms in place to measure the effectiveness of the programme's internal and external moderation systems for setting assessment instruments and grading students' achievements.

Judgment: ***Partially Addressed***

- The Panel notes the relevant UoB policies that manage the moderation of assessments which include the Teaching and Learning Policy, the Regulations of Study and Examination Policy, the Moderation of Assessments Policy and the Quality Assurance and Enhancement Policy. The Panel also reviewed the terms of reference and composition for the various committees.

- The Panel reviewed a sample of the moderation reports and was able to confirm that the Chemistry Department performs both pre- and post- internal assessment moderation using appropriate discipline experts who are selected by the department's Internal Moderation Committee and approved by the Department Council. The Panel was also able to confirm based on the submitted evidence and the interviews that were conducted during the site visit that the feedback from the internal moderators contributes to the review and improvements of assessment and the curriculum.

- The Panel was provided with the CVs of some of the external moderators and examples of the external moderation report. During the interviews, external moderators noted that the process of the external moderation was in their view sound and comparable with other institutions that they interacted with. However, the Panel was not provided with sufficient evidence in relation to mechanisms used to select, appoint and evaluate the performance of external moderators Therefore, the Panel recommends that UoB should develop a formal procedure for the selection, appointment and evaluation of external moderators.

- The Panel was informed during the interviews that external moderation provides an oversight to the effectiveness of the internal moderation processes. However, the Panel was not provided with sufficient evidence in relation to the formal mechanisms used to evaluate of the effectiveness of the external as well as the internal moderation processes. Therefore, the Panel recommends that UoB should develop a formal mechanism to regularly evaluate the effectiveness of internal and external moderation processes.

Indicator 3.4: Work-based Learning

Where assessed work-based learning takes place, there is a policy and procedures to manage the process and its assessment, to assure that the learning experience is appropriate in terms of content and level for meeting the intended learning outcomes.

Judgment: ***Addressed***

- The work-based learning primarily takes place *via* the 'Internship' (CHEMY399), which is a non-credit industry-based course that runs over a two-month period. The Panel interviewed the Internship Supervisors who confirmed that suitable procedures are in place to manage the work-based learning process and to ensure an equivalent experience amongst students. They also confirmed that the roles and responsibilities of the training supervisors and students are set out in the internship documents and are communicated to them.

- Evidence was provided for a comprehensive student grading and evaluation based on a number of criteria, which are clearly communicated to all parties. From interviews, the Panel was informed that appropriate induction was conducted by both the Department and the host company to ensure that students are fully aware of health and safety practices along with their responsibilities in order to ensure that the CILOs of the course are met. The Panel suggests expanding the internship document to include the specific CILOs that are related to the tasks and to clarify in detail the expectations from all the concerned parties.

- During the interviews, it was evident to the Panel that the work-based learning component was viewed as an important component of the learning experience of the students, which was noted by faculty, alumni and employers. The employers commented also on the soft skills training that supported the strong theoretical and laboratory skills of the students, which they felt was an invaluable component to the development of the students.

- The Panel examined samples of students work-based assessment and reports. These assessments indicate the scope of the areas where the students obtained experience such as water and oil analysis. The Panel is satisfied that the implementation and approach to the work-based learning is appropriate for the level and provides a good reflection of the student's abilities.

- The Panel found that there were several mechanisms by which the Department was able to evaluate the effectiveness of the work-based learning component. The first is the PAC which has industry-based members as part of the committee who provide some level of oversight to the BSc in Chemistry programme. The second is the direct feedback from the surveys that are conducted with the employers who during interviews confirmed that they had received and participated in surveys and provided feedback to the Department. Finally, as part of the international accreditation obtained from CSC, the Department is encouraged to focus on developing students' soft skills and this was echoed by PAC.

Indicator 3.5: Capstone Project or Thesis/Dissertation Component

Where there is a capstone project or thesis/dissertation component, there are clear policies and procedures for supervision and evaluation which state the responsibilities and duties of both the

supervisor and students, and there is a mechanism to monitor the related implementations and improvements.

Judgment: ***Addressed***

- The Programme has a 'Capstone Project' (Chemy499) course, which brings together a number of important skills into a single project. The Panel was provided with the marking rubrics for the Chemy499 and final grade forms. It was evident that the capstone project is well structured and administered. It was also evident that there are several mechanisms for the assessment of the student's performance which included a formal oral presentation of their findings.

- The Panel was able to review and confirm that student's projects reflect the range of skills obtained by students, which effectively contribute to the achievements of the Intended Learning Outcomes (ILOs). Furthermore, there is an interim progress report to ensure students' progress in achieving the ILOs. The Panel also noted the diversity of research topics available to the students ranging from computational based projects to green chemistry, analytical chemistry and general inorganic synthesis. The Panel appreciates the scientific approach that is followed when conducting the capstone projects.

- During interviews, the Panel was able to establish with the faculty that there is regular reflection on the learning outcomes of the capstone project to see where possible enhancements could be made; and an example was provided where new software elements were introduced such as DFT and drawing software. During the PAC members interview, they suggested to expand the capstone project further by doing some work in (or in collaboration with) industry laboratories as this would add additional depth to students' experience. The Panel encourages that the Department evaluate such possibility in future.

Indicator 3.6: Achievements of the Graduates

The achievements of the graduates are consonant with those achieved on equivalent programmes as expressed in their assessed work, rates of progression and first destinations.

Judgment: ***Addressed***

- The Panel was provided with examples of student course assessments. The Panel was also provided with a link to a repository of the portfolio of courses which contained the respective course syllabus, the methods of assessment as well as some examples of the marked students' assessments, which were examined by the Panel and found to be of appropriate standard. The Panel is also satisfied with the assessment of the practical aspects as they show the gradual level of complexity as students' progress.

- The CoS enrolment and graduation statistics have shown an increase in graduation rates over the years with the 2019/2020 data (summer semester) showing a graduation rate of 22.2%. The Department reports that graduation headcount rates for the following years are 2019 (47), 2020 (49), 2012 (31) and 2022 (117). The Panel noted that in the SER it is reported that the students under probation is currently at 25% and during interviews, the same was echoed about the graduation rate which was an area of concern that was receiving attention, with one strategy to improve advising and support to the affected students, however those students that were still not performing well would be diverted to a diploma from 2023.

- During interviews, the Panel was able to confirm that both alumni and industry partners were contacted by the Department in order to participate in surveys. The Panel noted that 80 out of 135 graduates over the period of 2018-2021 responded to the 2021 alumni survey. The results of this survey indicate that while 51% of the respondents obtained employment directly after graduation, it took more than two years for 40% of the respondents to obtain employment. The data also showed that 46% of the graduates were employed in the area of their specialisation. The survey also highlighted a view by the graduates that more practical skills would be useful in the undergraduate programme but the survey did not seek feedback on the types of skills that were seen as relevant. This same view was held by the current students in the programme.

- The feedback solicited from employers in the survey which was conducted in 2020 indicated that the graduates are well trained and possess high technical and scientific capabilities (over 80% responded such). Moreover, interviewed employers expressed their satisfaction with the quality of the students and the breadth of their knowledge. The Panel appreciates employers' satisfaction towards the level of chemistry graduates.

Standard 4

Effectiveness of Quality Management and Assurance

The arrangements in place for managing the programme, including quality assurance and continuous improvement, contribute to giving confidence in the programme.

Indicator 4.1: Quality Assurance Management

There is a clear quality assurance management system, in relation to the programme that ensures the institution's policies, procedures and regulations are applied effectively and consistently.

Judgment: ***Addressed***

- UoB has appropriate policies and regulations that meet the needs of its programmes and are well-communicated to all relevant stakeholders. Faculty members and students are introduced to UoB policies and regulations in the induction days assigned for them.

- The QAAC manages the quality assurance practices at the institutional level. The CoS has a Quality Assurance Office managed by a Director who is also the Head of the QAC at the college level. This committee is formulated by the Dean to enhance and monitor quality assurance practices. The Panel notes the clear and detailed structure of quality assurance at UoB and the job descriptions of every responsible person and committee that are provided in the Programme Quality Assurance and Enhancement Policy and Quality Manual.

- The Department has an Operational Plan that sets out the tasks for the academic year, which include reviews of updated courses, course portfolios, moderation forms and self-evaluation reports as per the quality assurance procedures. From interviews, the Panel noted that all academic staff are involved and aware of quality assurance practices.

- The Panel notes that there were changes in assessment policies as a response to the COVID-19 pandemic and the transition to online learning, which shows that the quality assurance management is capable of adopting to changes. However, nothing was provided in the SER or in the submitted evidence related to monitoring, evaluation or improvement in the quality assurance management system. Therefore, the Panel urges the QAAC to be more involved with the colleges to check the submitted documents along with the supported evidence to any external body to ensure the quality of the colleges submission; and the Panel recommends that UoB should ensure that the quality management system is monitored, evaluated and improved on a regular basis.

- **Indicator 4.2: Programme Management and Leadership**

The programme is managed in a way that demonstrates effective and responsible leadership and there are clear lines of accountability.

Judgment: ***Addressed***

- The CoS has a hierarchical organizational structure, which is appropriate for the management of the BSc in Chemistry programme. The CoS is led by a Dean who is responsible for the overall operations of the College and reports to the senior management at the University Council. The CoS also has a number of committees in addition to the Quality Assurance Office, which ensure compliance with institutional policies and regulations. These committees assist the Dean in running the different academic and administrative aspects at the college level and oversee the work of the counterpart committees at the department level. The committees at the department level report to the Department Council, which is chaired by the HoD who in turn reports to the College Council which is chaired by the CoS Dean. The Panel notes that the communication and reporting lines are very clear and known by all faculty members. The Panel also notes that each position has clear job description, and each committee has its own terms of reference.

- The custodianship of the academic standards rests mainly on the department level with the HoD being responsible for overseeing the BSc in Chemistry programme and running the daily activities of the Department. The course coordinators and committees at the department level assist the HoD in maintaining the academic standards through monitoring the quality of the delivery of the programme courses and assessment of student learning. Interviewed staff confirmed that there are clear regulations for the management of the programme and that the leadership is effective at the department, college and institution levels.

Indicator 4.3: Annual and Periodic Review of the Programme

There are arrangements for annual internal evaluation and periodic reviews of the programme that incorporate both internal and external feedback and mechanisms are in place to implement recommendations for improvement.

Judgment: ***Partially Addressed***

- UoB has in place appropriate policy and procedures for the internal annual evaluations and periodic reviews of its programmes. The internal annual evaluation results in a comprehensive report, which includes feedback from internal and external stakeholders such as student feedback *via* course evaluations and the feedback of employers and alumni *via* surveys. Moreover, the information from the Department Operational Plan forms part

of an annual self-evaluation report which is then discussed by the Department Council as clarified during the interviews.

- From the interviews, the Panel was able to confirm that there had been no internal periodic reviews of the programme and that the Department considers that the BQA review in 2016, the NQF placement in 2020 and the CSC reviews as being the periodic review of the programme. However, the Panel is of the view that external evaluation should not replace the internal periodic reviews of the programme. Therefore, the Panel recommends that the College should conduct a comprehensive periodic review of the programme as per the institution's policy.

Indicator 4.4: Benchmarking and Surveys

Benchmarking studies and the structured comments collected from stakeholders' surveys are analysed and the outcomes are used to inform decisions on programmes and are made available to the stakeholders.

Judgment: *Partially Addressed*

- The institution has a Benchmarking Policy, which aims to ensure that the programme is comparable to both regional and international ones. In the SER the Department only refers to a desktop benchmarking exercise, which was conducted against a number programmes of well-known institutions. The benchmarking report indicates that there is a good degree of overall similarity with the core discipline courses; along with some areas that ought to be considered to facilitate students' employment such as food chemistry, safety and hazardous chemicals amongst others. Therefore, the Panel recommends that the College should ensure that the benchmarking exercise is conducted in a more regular and structured manner *via* formal basis to cover the different aspects of the programme in an appropriate manner.

- There are formal mechanisms for collecting structured comments from students, alumni and employers *via* SAC, PAC and surveys. An overall course evaluation report is also compiled for each semester and discussed at the Department Council. The Panel examined the surveys conducted by the Department with employers in 2020 and with alumni in 2021. These surveys probe the satisfaction with the respective parties on the destinations of graduates, as well as the level of satisfaction with the curriculum. During interviews, it was established by the Panel that the feedback from the surveys was used by the Department to ensure that the needs of the graduates and the employers are being met; this was particularly emphasized in the meeting with PAC members.

- The Panel was able to verify during the interviews that the feedback from the various surveys was discussed by the various committees within the Department where

ultimately the improvement plans were approved, and progress monitored. The Panel was also able to confirm with the employers that they were satisfied with changes implemented based on their feedback.

Indicator 4.5: Relevance to Labour Market and Societal Needs

The programme has a functioning advisory board and there is continuous scoping of the labour market and the national and societal needs, where appropriate for the programme type, to ensure the relevancy and currency of the programme.

Judgment: ***Addressed***

- The Department has a PAC, which aims to enhance the relevance of the BSc in Chemistry programme to local labour market and societal needs. The PAC review the curriculum and study plans as well as the feedback received from employers and alumni *via* surveys. During the interviews, the Panel learnt that the PAC meets three to four times per year. The Panel reviewed the minutes of meetings that were provided as part of the supporting material and noted the content of the deliberations of the PAC, which is in alignment with the terms of reference for this committee. The Panel also noted the diversity of the PAC members representing the local industries of Bahrain.

- The Panel interviewed the PAC members and was able to confirm that the committee plays an active and invaluable role in advising the Department. For example, the PAC described to the Panel the deliberations that had taken place around the introduction of electives such as water treatment, Nano-chemistry and corrosion chemistry, which was also raised during interviews with staff that there was wide consultation and discussion around these electives within the Department. The Panel appreciates the supporting role that the PAC members provide to the Department which includes relevant feedback related to labour market needs for the discipline of chemistry.

- The Panel was only provided with a Market Needs Survey that was conducted amongst the typical employers of the chemistry graduates. The general feedback of this survey was positive indicating that the level of understanding of the graduates generally met their needs and they would likely employ further graduates in the years ahead. The Panel was not provided with sufficient evidence to prove that market studies are regularly conducted. Therefore, the Panel recommends that the College should develop a formal mechanism to ensure that the programme meets labour market and societal needs.

V. Conclusion

Taking into account the institution's own self-evaluation report, the evidence gathered from the interviews and documentation made available during the virtual site visit, the Panel draws the following conclusion in accordance with the DHR/BQA *Academic Programme Reviews (Cycle 2) Handbook, 2020*:

There is Confidence in the Bachelor of Science in Chemistry programme of the College of Science offered by the University of Bahrain.

In coming to its conclusion regarding the four Standards, the Panel notes, *with appreciation*, the following:

1. The arrangements taken by the College to support students with special needs.
2. The scientific approach that is followed when conducting the capstone projects.
3. Employers' satisfaction towards the level of chemistry graduates.
4. The supporting role that the members of the Programme Advisory Committee provide to the Department which includes relevant feedback related to labour market needs for the discipline of chemistry.

In terms of improvement, the Panel recommends that the University of Bahrain or the College should:

1. Revise the mapping of the course intended learning outcomes to the programme intended learning outcomes.
2. Ensure that the admission policy is regularly revised, and that published admission information is accurate.
3. Expedite the recruitment of new faculty members from different disciplines of chemistry.
4. Develop a mechanism to ensure that the laboratories are maintained on a regular basis.
5. Enhance the advising process and ensure that students attend the advising meetings regularly.
6. Develop a formal procedure for the appointment of external moderators.
7. Develop a formal mechanism to evaluate the effectiveness of internal and external moderation processes.
8. Ensure that the quality management system is monitored, evaluated and improved on a regular basis.

9. Conduct a comprehensive periodic review for the programme as per the institution's policy.
10. Ensure that the benchmarking is conducted in a more regular and structured manner *via* formal basis to cover different aspects of the programme.
11. Develop a formal mechanism to ensure that the programme meets labour market and societal needs.