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

Directorate of Higher Education Reviews

Programmes-within-College Reviews Report

B.Sc. in Chemistry

College of Science

University of Bahrain

Kingdom of Bahrain

Date Reviewed: 12-16 March 2017

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Acronyms

BSCH	B.Sc. in Chemistry
BQA	Education & Training Quality Authority
CILO	Course Intended Learning Outcome
CSC	Canadian Society of Chemistry
DAC	Department Quality Assurance Committee
DHR	Directorate of Higher Education Reviews
GPA	Grade Point Average
HEC	Higher Education Council
MIS	Management Information System
PAC	Professional Advisory Committee
PCAP	Postgraduate Certificate in Academic Practice
PEO	Programme Educational Objective
PILO	Programme Intended Learning Outcome
QA	Quality Assurance
QAA	College Quality Assurance and Accreditation Office
QAAC	Quality Assurance and Accreditation Centre
SAC	Student Advisory Committee
SER	Self-Evaluation Report
UoB	University of Bahrain

The Programmes-within-College Reviews Process

A. The Programmes-within-College Reviews Framework

To meet the need to have a robust external quality assurance system in the Kingdom of Bahrain, the Directorate of Higher Education Reviews (DHR) of the Education & Training Quality Authority (BQA) has developed and is implementing two external quality review processes, namely: Institutional Reviews and Programmes-within-College Reviews which together will give confidence in Bahrain's higher education system nationally, regionally and internationally.

Programmes-within-College Reviews have three main objectives:

- to provide decision-makers (in the higher education institutions, the BQA, the Higher Education Council (HEC), students and their families, prospective employers of graduates and other stakeholders) with evidence-based judgements on the quality of learning programmes
- to support the development of internal quality assurance processes with information on emerging good practices and challenges, evaluative comments and continuing improvement
- to enhance the reputation of Bahrain's higher education regionally and internationally.

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

Indicator 1: **The Learning Programme**

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

Indicator 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 3: **Academic Standards of the Graduates**

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

Indicator 4: **Effectiveness of Quality Management and Assurance**
The arrangements in place for managing the programme, including quality assurance, give confidence in the programme.

The Review Panel (hereinafter referred to as 'the Panel') states in the Review Report whether the programme satisfies each Indicator. If the programme satisfies all four Indicators, the concluding statement will say that there is 'confidence' in the programme.

If two or three Indicators are satisfied, including Indicator 1, the programme will receive a 'limited confidence' judgement. If one or no Indicator is satisfied, or Indicator 1 is not satisfied, the judgement will be 'no confidence', as shown in Table 1 below.

Table 1: Criteria for Judgements

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

B. The Programmes-within-College Reviews Process at the University of Bahrain

A Programmes-within-College review of five programmes offered by College of Science at the University of Bahrain (UoB) was conducted by the DHR of the BQA in terms of its mandate to review the quality of higher education in Bahrain. The site visit took place on 12-16 March 2017 for the five academic programmes offered by the College, these are B.Sc. in Chemistry, B.Sc. in Biology, B.Sc. in Mathematics, B.Sc. in Statistics and Operational Research and B.Sc. in Physics.

UoB was notified by the DHR/BQA on 13 October 2016 that it would be subject to a Programmes-within-College reviews of programmes offered by the College of Science with the site visit-taking place in March 2017. In preparation for the review, the College of Science at UoB conducted self-evaluation of these programmes and submitted the Self-Evaluation Reports (SERs) with appendices on 25 Dec 2016.

The DHR constituted a panel consisting of experts in the academic field of Science and in higher education who have experience of external programme quality reviews. The Panel comprised 10 reviewers.

This Report provides an account of the review process and the findings of the Panel for the B.Sc. in Chemistry based on:

(i) analysis of the Self-Evaluation Report and supporting materials submitted by the institution prior to the external peer-review visit
(ii) analysis derived from discussions with various stakeholders (faculty members, students, graduates and employers)
(iii) analysis based on additional documentation requested and presented to the Panel during the site visit.

It is expected that the UoB will use the findings presented in this Report to strengthen its B.Sc. in Chemistry. The DHR recognizes that quality assurance is the responsibility of the higher education institution itself. Hence, it is the right of UoB to decide how it will address the recommendations contained in the Review Report. Nevertheless, three months after the publication of this Report, UoB is required to submit to the DHR an improvement plan in response to the recommendations.

The DHR would like to extend its thanks to UoB for the co-operative manner in which it has participated in the Programmes-within-College review process. It also wishes to express its appreciation for the open discussions held in the course of the review and the professional conduct of the faculty and administrative staff of the Chemistry Department.

C. Overview of the College of Science:

The College of Science, at UoB, was originally established as a part of the University College of Arts, Science and Education, which was founded by the Amiri Decree number 11 in 1978. In 1986, Amiri Decree No. (12) was issued to establish the University of Bahrain by a merger of the Gulf Polytechnic and the University College of Arts, Science and Education. In 1990, the Board of Trustees of UoB issued a decision to divide the College of Arts & Science into two separate colleges: The College of Arts and the College of Science. Currently, the College of Science under the UoB has four academic science departments: the Department of Chemistry, Biology, Mathematics, and Physics. These departments offer undergraduate programmes of study in natural sciences that lead to Bachelor of Science (B.Sc.) qualifications as well as Master of Science programmes. At the time of the site visit, the College was employing 83 faculty members, including five part-time, and 58 administrative staff. The total number of enrolled students was 1,165 students.

D. Overview of the B.Sc. in Chemistry:

The Department of Chemistry in the College of Science at the University of Bahrain currently offers the four year B.Sc. in Chemistry (BSCH) programme at Sakhair campus. The programme originally started in 1978, in one of the four departments of the University College of Arts, Science and Education, and in 1986 the programme

continued under UoB. The programme was accredited by the Canadian Society of Chemistry (CSC) in 2009 and was again reaccredited by the CSC in 2015; and at the time of site visit the total number of students enrolled in the programme was 284, with the total number of graduates being 567**.** Currently, there are 16 full- and four part-time faculty members, supported by 22 administrative staff contributing to the delivery of the programme.

E. Summary of Review Judgements

Table 2: Summary of Review Judgements for the B.Sc. in Chemistry

Indicator	Judgement
1: The Learning Programme	Satisfies
2: Efficiency of the Programme	Satisfies
3: Academic Standards of the Graduates	Satisfies
4: Effectiveness of Quality Management and Assurance	Satisfies
Overall Judgement	**Confidence**

1. Indicator 1: The Learning Programme

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

1.1 The University Planning, Programme Development, and Quality Process frameworks are well-designed and effectively implemented. The university's strategic plan, which can be found in many notice boards in and near the Department of Chemistry, lays out a set of actions designed to enhance quality in academic programmes. There is a Programme Development and Modification Policy which establishes the procedures that must be followed in the development or revision of a course or programme. The programme's aims clearly contribute to the institutional mission of providing relevant educational experiences for its students by generating for the Kingdom of Bahrain a cadre of skilled scientists who are capable of contributing directly to the economic growth and development of the country, and hence helping to enhance the quality of life. The Programme Educational Objectives (PEOs) are clearly outlined in the programme specifications and embed the programme aims towards the students that include building successful careers in Chemistry, pursuing graduate studies and life-long learning and to have ethical obligations towards society. The Panel appreciates that the programme aims are appropriate for a B.Sc. in Chemistry programme and are aligned with the institution's mission.

1.2 The B.Sc. in Chemistry (BSCH) programme's curriculum recognizes that chemistry is a vertical science and is well designed from both progression and pre-requisite viewpoints. There is plenty of laboratory and computer work, providing the balance between knowledge and skills, and theory and practice, as does the inclusion of a required internship and a chemistry research experience. The 127-credit hour requirement is in the typical range for undergraduate chemistry programmes and to complete the programme in four years, students need to take on average 15 credits per semester and a maximum of 18 credits in one of the semesters, demonstrating that the workload is appropriate and reasonable. The 127 credits are divided into university requirements (11 credits), college requirements (38 credits), department requirements (63 credits), department electives (9 credits) and university free electives (6 credits). The curriculum includes courses in general education, English language skills, mathematics and basic science, chemistry core courses and electives, as well as courses that support professional experience and life-long learning. Moreover, the curriculum was accredited by the CSC in 2009 and 2015 and the CSC's recommendations were implemented during the process. The Panel appreciates that the curriculum is well designed to provide academic progression and balances between knowledge and skills. Notwithstanding the above, the Panel is of the view that the programme is a traditional one, and the Department could consider the inclusion of more relevant electives, such as petro chemistry, polymer chemistry, medicinal chemistry, or

corrosion chemistry, or the introduction of tracks within the programme to enhance its relevance to the needs of the Kingdom of Bahrain and increase the potential employability of its graduates, which was confirmed during interviews with alumni and employers. The Panel recommends that the College should consider revising the list of elective courses or introducing tracks within the programme that enhance the programme's relevance to the needs of the local and regional market.

1.3 The Chemistry department uses a course syllabus template to record the details of the courses, which includes general course information, prerequisite, Course Intended Learning Outcomes (CILOs) and their alignment to the Programme Intended Learning Outcomes (PILOs), textbooks and references, course description, assessment, and a weekly breakdown table. The table includes the topics to be covered per week, and the CILOs, teaching methods and assessment which are aligned to the topics in each week. According to the SER, the programme and its course contents are aligned with the CSC criteria for Chemistry Programmes after the programme's reaccreditation by the CSC in 2015 and some courses were modified during the revision. For example, computational chemistry and modelling chemical kinetics were included in physical chemistry courses, CHEMY 432 and CHEMY 331. The Panel studied the course outlines and notes that there are three required courses in mathematics, which include differential equations, and the Panel considers this as a strength. Nonetheless, some students with whom the Panel met felt that much of this advanced calculus was only sparingly used in chemistry courses. The programme also includes a compulsory senior research component, CHEMY 499, and recent research findings in chemistry is included in the students' preparation for their senior research project. The Panel acknowledges that the syllabus is a traditional one, and covers the requirements of a Bachelor of Science in Chemistry, and that the accreditation by the CSC addresses the appropriateness of the curriculum and its coverage. Moreover, the textbooks examined by the Panel are all modern editions of internationally-recognized texts. Nonetheless, from viewed course files, the Panel notes that there is little or no interdisciplinary teaching and learning in the programme. Hence, the Panel recommends that the College should make interdisciplinary or multi-disciplinary learning a part of the syllabi.

1.4 The programme specifications provide four PEOs, that graduates should attain within a few years of graduation and nine PILOs that students should achieve by the time of graduation. The PILOs are also stated in each of the course specifications and cover knowledge of basic discipline areas, ability to conduct experiments, having analysis skills, the use of software tools, to acquire research skills and to employ modern search tools, having effective communication skills, act with integrity and ethics and to acquire broad knowledge. The Panel scrutinised the PILOs and found them to be properly written, measurable and appropriate for the level of the programme. Moreover, the PILOs are properly mapped to the PEOs. Furthermore, the PILOs are

linked with the institution's mission 'To contribute directly to the economic growth and development of Bahrain, supported by leading edge teaching, technology and research with regional impact', and the college's mission '…provide students with knowledge, intellectual and general skills, prepare them for future careers, graduate and professional studies, and to be active and responsible members of society…'. The PILOs are also properly mapped to the University Intended Learning Outcomes (UILO) (communication, technology competence, critical thinking knowledge and skills, information literacy, responsibility and integrity, and life-long learning) and to the University Objective Domains that include categories in life-long learning, research, development of professional skills and community service. The Panel appreciates that there are clear programme documentations that include PILOs that are appropriate for the level of the programme, and are appropriately aligned with the programme aims and the missions of the College and the University.

1.5 Each course within the programme has a set of CILOs that are stated in the course specification, which also include the mapping of these CILOs to the PILOs. The Panel viewed a sample of the course specifications at different levels and notes that the CILOs are appropriate for the course aims and their levels, and cover suitable cognitive skills that are expected from the students. According to the SER, 'the CILOs are written in the course syllabus and are explained to the students at the beginning of the term in accordance with the university's internal quality assurance policies and guidelines'. From student interviews conducted during the site visit, the Panel confirmed that students receive course specifications in the beginning of the semester and that they are aware of what the courses cover and their assessment requirements. Moreover, the Panel learnt during faculty interviews and from the SER that the Quality Assurance of the Department revises the CILO's of all courses and their mapping to the PILO's and assures that the courses meet the requirements of UoB's Quality Assurance & Accreditation Committee (QAAC) and any changes are discussed at the programme Academic Committee. The Panel studied the mapping of the CILOs to the PILOs and notes that the programme core courses are properly mapped to the PILOs. Hence, the Panel appreciates that the CILOs are well-written, measurable and that the core courses are properly mapped to the PILOs. Nonetheless, the Panel notes that a few elective courses are mapped to all the PILOs. The Panel recommends that the College should revise the mapping of the elective courses to be more selective in how they contribute to the achievement of the PILOs.

1.6 A significant strength of the programme is the importance attached to work-based learning, which is provided by the required training course (CHEMY 399). There are policies and procedures to manage the course which include assessment, the role of the supervisors, one from industry and the other from the Department, and what is expected from the student. Moreover, the course specification covers the course contents, the CILOs and their mapping to the PILOs, and these are appropriate for the

intended course. The course does not carry credit and students must complete two months of training at a public or private sector organization according to their interests. Hence, the Panel recommends that the College should revise the internship course to allocate credit to it that represent a weight appropriate to the amount of learning achieved by the students. The course has a prerequisite of 75 credit hours, ensuring that the student has adequate background in both theoretical and laboratory chemistry. Assessment involves a written report by the student (40%), evaluation by the internship supervisor (40%), and site visit(s) by the faculty mentor (20%). Moreover, students complete a Training Evaluation Questionnaire on their experience during the training they received at the end of the period. Discussions with alumni and employers emphasized the importance of this course, and there have been cases of offers of employment resulting from successful completion of the internship. Moreover, employers with whom the Panel met were aware of the training policies and were uniform in their praise of the quality of the graduates they employ. The Panel notes with appreciation that the work based learning component is managed by clear procedures, stakeholders are aware of these and consider the training course a significant strength to the programme.

1.7 There is a university wide Study and Examination Regulations document (2013) and a Teaching and Learning Policy that is currently undergoing formal approval. During interviews, the Panel was informed that the programme has adopted a number of teaching and learning methods in line with the university wide regulations and policy. From interviews and studied course files, the Panel notes that the courses in the programme use a variety of teaching methods as appropriate to the material. Moreover, course specifications include a weekly breakdown of the course material which is mapped to the teaching methods and the CILOs. In addition to traditional classroom lectures, the faculty in the programme use appropriate software in higher level courses, conduct field visits to chemical operations in the Kingdom, and enhance classroom experiences through the use of PowerPoint and other presentation vehicles. Students are engaged in their own learning process through their required participation in research, which is achieved as part of the senior research project course, CHEMY 499. Exposure to current chemical practice is achieved through the internship course, CHEMY 399. According to the students themselves, the projects and practical work are major factors in developing student personal responsibility for learning. In meetings with students, the Panel learnt that the students are generally satisfied with the teaching methods employed in the programme, while the 2014-2015 exit survey results indicate that 57.1% of the students consider that teaching in the programme is effective and only 42.9% were satisfied during 2015-2016. Hence, the Panel advises that the College should investigate the reasons behind the low satisfaction of students and mitigate appropriate solutions. Discussions with faculty suggested that the use of Blackboard as a teaching tool is less widely used than it could be, and data obtained from university administrators demonstrates that only two

courses are currently using Blackboard in any way. Since learning management systems such as Blackboard offer numerous features to assist both faculty and students, the Panel recommends that the College should augment the programme delivery with e-learning techniques and use learning management systems in a more consistent and ubiquitous manner.

1.8 According to the SER, 'the Department of Chemistry follows UoB's Study and Examination Regulations and the Assessment and Moderation Policy'. Furthermore, there is a university Programme Quality Assurance and Enhancement Policy as well as Assessment, Grading, and Examination Moderation Guidelines. Moreover, there is an Anti-Plagiarism Policy at the university level which covers approach, prevention, detection, penalties and the process for handling plagiarism incidents. These stipulate that assessment should be consistent with CILO's, and that it is fair and impartial. Moreover, both summative and formative assessments are to be utilized. Students should receive prompt feedback and within two weeks of the assessment. Moderation of assessment to be achieved through a committee of experienced instructors who are able to check grading and recommend changes where appropriate. Final grades are electronically submitted to the registration office by the instructor after the approval of the of the Chairperson. According to the SER, 40% of the assessment marks are allocated to the final examination while the remaining 60% is for the course work which could include between one and three tests depending on the type of the course. During interviews, the Panel was informed that course specifications are provided to the students at the beginning of the semester, which include information on assessment tasks and methods, mark distribution, the mapping of the assessment to the CILOs and state excerpts on plagiarism. The Student Handbook provides general information on assessment and exams. Interviewed students confirmed that they receive course specifications at the beginning of the semester and they were aware of the assessment requirements for their courses. Moreover, feedback was given in written form for the tests and more often verbally in the classroom or during consultations with faculty. Students noted that they have the opportunity to discuss their marks with the concerned faculty and can submit official appeal against their final course grades. The Panel acknowledges the arrangements in place to manage assessment tasks. During interviews, faculty were aware of the assessment policies and procedures implemented for the programme. Nonetheless, they were not aware of the Assessment, Grading, and Examination Moderation Guidelines document that was submitted by the College as part of the evidence. Moreover, policies and procedures related to assessment are variable and are specified in multiple documents that are published at the institutional level. Hence, the Panel advises that the College should develop a comprehensive assessment policy that covers all relevant aspects and ensure its effective communication to all stakeholders.

1.9 In coming to its conclusion regarding The Learning Programme, the Panel notes, *with appreciation*, the following:

- The programme aims are appropriate for a B.Sc. in Chemistry programme and are aligned with the institution's mission.
- The curriculum is well designed to provide academic progression and balances between knowledge and skills.
- There are clear programme documentations that include Programme Intended Learning Outcomes that are appropriate for the level of the programme, and are appropriately aligned with the programme aims and the missions of the College and the University.
- The Course Intended Learning Outcomes are well-written and are measurable, and the core courses are properly mapped to the Programme Intended Learning Outcomes.
- The work based learning component is managed by clear procedures, and stakeholders are aware of these and consider the training course a significant strength to the programme.

1.10 In terms of improvement the Panel **recommends** that the College should:

- consider revising the list of elective courses or introducing tracks within the programme that enhance the programme's relevance to the needs of the local and regional market
- make interdisciplinary or multi-disciplinary learning a part of the syllabi
- revise the mapping of the elective courses to be more selective in how they contribute to the achievement of the Programme Intended Learning Outcomes
- revise the internship course to allocate credit to it that represent a weight appropriate to the amount of learning achieved by the students
- augment the programme delivery with e-learning techniques and use learning management systems in a more consistent and ubiquitous manner.

1.11 **Judgement**

On balance, the Panel concludes that the programme **satisfies** the Indicator on **The Learning Programme.**

2. Indicator 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.

2.1 The University of Bahrain has a clear admission policy which is available on the University website and in its Study and Examination Regulations. Applicants to the UoB should satisfy the following requirements: a minimum grade of 70% in the secondary school certificate or its equivalent; no more than two years shall have passed since the applicant obtained his/her secondary school certificate and the applicant should attend an aptitude test as well as a personal interview. Moreover, to be admitted to the BSCH programme students should have completed the science or unified track at secondary school. Depending on the capacity of the programme, the admission priority to the BSCH programme is based on a weighted average of three factors, being; the outcome of an interview (15%), the high school score (70%) and the aptitude test scores (15%). During interviews, the Panel was informed that direct entry to the programme is achieved for applicants whom have scored 90% or above in their secondary school certificate and those applicants are exempted from the English language test. Applicants who did not achieve direct entry are admitted to a one semester orientation programme. The orientation programme consists of one non-credited nine hours per week course, namely, Orientation English Programme (ENGLR 015). Transfer students are also admitted to the programme and for exemptions to be considered for previous taken equivalent courses a minimum grade of (C+) is required. Moreover, interviewed staff and students were aware of the admission procedures and regulations. The Panel acknowledges that there is a clear admission policy that is consistently implemented.

2.2 The Panel studied the provided evidence on the profiles of the admitted students to the programme and notes that they comply with the admission criteria. Furthermore, the number of students accepted directly into the programme, and without taking orientation, has increased from 2012-2013 to 2016-2017, from 35% to over 50%. It is apparent from the SER that the number of admitted female students is progressively increasing year after year, where the percentage of female students is 87% of the total in 2016-2017. The Panel was informed during interview sessions that this is attributed to the fact that the most secured employment of the programme graduates is being employed as science schoolteachers, which is not always preferred by male students. During interviews the Panel learnt that some students had difficulty in English at the early stages of the programme, which hinders their successful or timely completion of the programme. Students in the last years of their studies had better command of English in general, where the language concern is taken care of through the two required courses of English for science (English 125 and English 126), which increase the Scientific English language abilities among students. Hence, the Panel

recommends that the College, in collaboration with the University, conduct a thorough study to identify the reasons behind the low progression and retention rates, and develop a plan to mitigate the issue including a full revision of its requirements for English language competencies and the structure and content of the orientation programme.

2.3 The BSCH programme is managed by the Chairperson of the Department of Chemistry who is responsible for the day to day running of academic and administrative issues. The job description and responsibilities of the Chairperson are clearly spelled out in the QAAC Quality Manual. The hierarchy of administrative chart shows that the department's Chairperson reports to the Dean of the College. Matters are first discussed at the Department Council before raising them by the Chairperson to the Dean. The Department Council, chaired by the department's Chairperson is the authority for making recommendation and decision making for the programme. Shared governance of the Department is practiced through departmental committees covering all necessary aspects, which includes committees for recruitment, promotion, scheduling, curriculum, conferences & seminars, laboratories & equipment, senior project, internship, advisory, multi-sections and quality assurance. From interviews and evidence provided, the Panel was able to confirm that the established hierarchy for the management of the programme is effective and faculty are involved in the academic and administrative aspects of the programme through the committees, as noted in the minutes of committee meetings. The Panel appreciates that there are clear lines of accountability with regards to the management of the programme.

2.4 According to the SER, the Department of Chemistry, which offers the BSCH programme, in 2016-2017 employed 16 full-time and four part-time faculty members. There were 14 PhD holders at the following ranks; two Professor, two Associate Professors and nine Assistant Professors; and the remaining were instructors. Moreover, there were 20 administrative staff (including technicians) with qualifications ranging from MSc to high school certificate. The Panel studied the CVs of the faculty members and notes that the Chemistry programme has a coherent team of faculty members with diverse academic backgrounds and expertise, which the Panel views as a real asset for the programme. The Panel notes, with the exception of one faculty member, there was no research publication during the past five years as evidenced from the submitted CV's of faculty members. Interviews and evidence indicate that faculty member's responsibilities include teaching, advising, research, committee work, and community service, while the major emphasis, however, is on teaching. According to the provided evidence the teaching load of faculty members is way higher than the maximum defined by the university (15 contact hours for PhD holders and 18 for holders of a lesser degree). During interviews with the faculty, the Panel was informed that this high teaching overload is affecting the teaching, research, and community service on which a faculty member's contribution is evaluated for

appraisal or promotion purposes. Moreover, the SER also highlights that faculty members 'teach service courses as well as the programme courses which puts heavy load on them'. This high teaching load is in addition to the academic advising, project supervising and administrative processes he / she might be involved in. However, the Department delivers a number of service courses to other programmes offered by UoB's different colleges. This has resulted in unacceptable high teaching loads that exceeds UoB's own work load policy. In addition, three senior faculty members are approaching retirement and the Panel was not provided with clear plans for filling these positions in the future, which could further impact the teaching load. The Panel concludes that although faculty members' academic qualifications are appropriate and they certainly have the experience to undertake the required tasks, the teaching overload has a high impact on the efficiency elements of the programme. Hence, the Panel recommends that the College should revise the faculty workload to ensure that it is not excessive in order to ensure faculty effectiveness.

2.5 Recruitment criteria for both faculty and administration staff are expressed in the Academic and Administrative Bylaws, which also states that the 'Department Council may form a committee to propose recruitment of faculty members'. Moreover, procedures for Academic Recruitment are defined which include the recruitment of Graduate Assistants, Lecturers, Assistant Professors, Associate Professors, and Professors. From interviews and evidence provided, the Panel confirmed that these policies and procedures are consistently implemented in a transparent manner. Furthermore, the Panel was informed that there are certain implemented measures by UoB that support faculty retention, that include a locally competitive salary package for faculty members. Moreover, the university provides rewards and incentives that include research grants, publication rewards, paid faculty consultancy, salary increases for distinguished candidates and health insurance. Interviewed faculty members were satisfied with these measures, and evidence shows that only in rare cases staff leave the Department and these are mainly due to retirement. The Panel appreciates that there is clear recruitment policy that is consistently implemented and retention rate is high in the Department. Nonetheless, the Panel was informed during the site visit that newly recruited faculty members are informally introduced to the Department facilities and its staff by the Chairperson. Therefore, the Panel recommends that the College should implement a formal faculty induction policy for the programme and evaluate its effectiveness. Although, student evaluation of faculty is conducted regularly, the Panel learnt during interviews that formal faculty appraisal is conducted when faculty members apply for promotion or contract renewal (see paragraph 4.9). For contract renewal, the Department Council forwards its recommendations to the College Council, which forwards its recommendations to the University Council for final approval. The Panel was informed by faculty members that these measures so far have proved to be effective. The promotion policy for faculty members is clearly stated in the Regulations and Appendices of Academic Promotion

at the University of Bahrain which was approved by the University Council in 2012. The promotion policy covers the three main functions expected from a faculty member; teaching and learning, research and community engagement, with heavily reliance on scholarly activities and emphasis on publications in peer-reviewed journals, which in the panel's view is fair and common in most universities. On receiving a promotion application, the Chairperson completes an evaluation form which rates the candidate's professional conduct, planning of teaching, effective teaching and the assessment of students. The evaluation form and all the submitted documents by the candidate are evaluated by the Department Promotion Committee. The committee's recommendations are forwarded to the College and subsequently the University Council for final approval. During interviews, the Panel was informed that promotion procedures were consistently implemented. Nonetheless, many faculty members stayed in their academic ranks for many years where one promotion of a chemistry faculty member to the rank of an associate professor took place in 2014 and another was to the rank of professor in 2005. Moreover, interviewed staff members raised their concern about the prescriptive scoring systems based on individual publications rather than team activities. The Panel notes that the promotion system is inactive in the chemistry programme which is a result of the high teaching load, as noted in paragraph 2.4. The Panel urges the College to take measures that support the promotion of faculty members and provide them with the required time and resources to support the advancement of faculty in academic rank (as recommended in paragraph 2.4).

2.6 According to the SER, there is a Management Information Systems (MIS) that keeps all information relevant to students and is used by the Chairperson, advisors, staff and students. The system allows students to register, add or drop their courses, view their records and pay fees. Faculty members can view the registered students in the courses they teach and submit student grades. The system also allows the Chairperson to approve the grades submitted by the faculty members and allows academic advisors to monitor their advisees. There is also a human resources system which is used to access staff records, process the payment of their salaries and keep attendance of administrative staff. The Chairperson has access to these records and can use the system to complete the appraisal of administrative staff. Interviewed students and faculty members, indicated their appreciation for the provision of online systems that help staff and students conduct vital online procedures. During the site visit, the Panel confirmed the provision of the MISs which support the programme. The Panel appreciates that there are MISs that are implemented effectively for the management of student and staff information.

2.7 There are policies and procedures at the institutional level to ensure the security of learners' records and accuracy of results. Moreover, the IT centre has policies and procedures in place for the security of the information that is kept on their systems

electronically. During the site visit, the Panel confirmed that the Deanship of Admission and Registration is responsible for handling student records. Moreover, student records, such as assessment, reports and grades are kept in the Department for two consecutive semesters. At the end of the semester, faculty members are provided online access to a portal for entering the grades of student who are registered in the courses they teach. The Chairperson can view and approve the grades submitted by the faculty members and forward them to the Dean of Admission and Registration for final approval. Applications for changing grades are initiated in the Department and require the approvals of the College Dean and University Council before being applied. There are access levels with passwords in place that allow various levels of authorized access. Moreover, UoB has a robust backup and disaster recovery system which are governed by policies and procedures, and the Panel confirmed their implementation during the site visit. The approved IT plan and Information Technology Policies and Procedures, describes all confidentiality and security requirements. Moreover, there is a disaster recovery site that is kept off campus. This site holds regular backups of the system and has a standby database that can be linked to if required. During the site visit, the Panel was able to confirm that the aforementioned policies and procedures were in place. The Panel appreciates that there are clear procedures in place for risk management, back-up and security of information that are implemented in an effective manner to support the programme.

2.8 During the site visit, the Panel toured the Department, College and University recourses and facilities at Sukhir Campus. The Panel notes that within the Department, faculty members have adequate individual offices, helpful for advising students. Furthermore, classrooms are of medium size that can accommodate up to 40 students and there is a lecture hall that can accommodate multi-section classes, and these are equipped with multimedia facilities. Furthermore, the Department has adequately equipped laboratories which include 12 dedicated practical laboratories, three instrument laboratories and a central laboratory. In addition, there are six research laboratories which are used by faculty members and senior project students. The Panel confirmed during the tour that health and safety rules and regulation are posted in all laboratories, which are adhered to by staff and students. The Panel notes that lecture halls and laboratories (though small in size and number) are well equipped but some equipment were dated and there were a few that were out of order. The SER states that the number of students enrolled in programmes offered by the Department has been increasing. The Panel is of the view that these classroom facilities are barely adequate at this time and larger rooms would be essential if the Department is called on to serve higher numbers of students in the future. Students also have access to an open area computer laboratory that is housed in the College of IT and in close proximity to the College of Science, which has 220 workstations with varied types of software for the general use. Moreover, students have access to Wi-Fi all around the campus and are provided with an email address, a one Tera Byte of personal hard disk

space on the university server and Microsoft Office 365. Also, the e-learning centre provides Blackboard as an e-learning resource for faculty members to host their courses for programme students. The Panel toured the College of IT and Science Library, which is in walking distance to the Department, and notes that there is an adequate collection of text books and journals. Also computers are available for searching different electronic data bases held within the main library. During the tour of the university's main campus library, the Panel was informed that there are electronic and printed resources available for the BSCH students and faculty that support the programme courses and research. Furthermore, many e-resources can be accessed both on and off campus by students and staff, and both library facilities are staffed with qualified personnel. Moreover, the Department provides common areas for students for out-of-class study and there are more than 150 seats for students in the specialised library. The Panel acknowledges that the library resources support the programme and are comparable with other regional universities. Nonetheless, the Panel notes that the library has old hard copy books because it is more interested in e-copies of books, and the Panel is of the view that there should be more focus on acquiring hard copies of chemistry text books as many good books are available as hard copies only. The Panel notes that the available resource are suitable for the B.Sc. in Chemistry programme. However, the Panel recommends that the College, in collaboration with the University, should expand the capacity of the classrooms and the associated laboratories to ensure their suitability for the growing student enrolment.

2.9 There are a number of tracking systems that are employed for the use of the different resources in the Department, some being manually implemented and others electronically. During the tour of the facilities, the Panel observed that all classrooms and laboratories have their time tables posted at the door and due to 'the large number of students most of the laboratories in the Department are occupied from 8:00 am until 6:00 pm'. Moreover, tracking the usage of these facilities and occupancy of laboratories are mostly done manually, and the technicians are responsible for tracking the consumables in the laboratories. The e-learning centre provides support for staff and students and generates data on the utilisation of its resources. The centre offers Blackboard which has up-to-date tracking of e-learning usage. According to the SER, the library is in the process of implementing a services assessment tool 'LibQUAL+', which is a web-based survey. Moreover, the library records usage data as well as conducts surveys and provides detailed reports on the use of library resources such as book checkouts and renewals, inter-library loan and library visitors. During the tour of the library, the Panel observed that a suggestion box is available at the library entrance. The Panel acknowledges that there are tracking systems that are employed by various entities which generate useful data but no evidence was found that these are being used to inform decision making at a holistic and strategic level relevant to

the programme delivery. Hence the Panel encourages the College to further utilise the information generated by the tracing systems to enhance its decision-making.

2.10 According to the SER a range of student support is available for the programme at the Department, College and University levels. This encompasses support in the laboratories, academic advising, library, support for e-learning, IT support, careers and social counselling. During the site visit, the Panel had the opportunity to visit various entities that provide support services and received the views of stakeholders on the effectiveness of these services. The Deanship of Student Affairs is mandated with providing various kinds of support covering student life to financial support where students can be exempted from tuitions fees if they qualify. The Students Services and Development Department provides all students with transportation, special services for students with disabilities, medical treatment, as well as social and psychological guidance through a dedicated social advisor who is based in the College. The Career and Counselling Office provides guidance to students for their future careers, by providing general awareness campaigns as well as individual counselling. Moreover, students and graduates receive mentoring during the process of job application and are helped in writing their resume. Furthermore, an annual Careers Day is organized on regular basis and students have the opportunity to meet potential employers and seek guidance while at the event. The e-learning centre provides guidance and support for Blackboard learning management system. As well as the staff in the main library there are seven support staff at the College of IT and Science library. There are three study rooms within the College library in addition to a room that is reserved for the visually impaired. The library is staffed with qualified personnel who provide students and faculty with information and training for effective usage of the resources, such as library induction and training workshops on databases, writing scientific reports and understanding university regulations and plagiarism. Moreover, there is a liaison librarian who coordinates with the college and department's information literacy programmes and collection development concerned with the programme. There are qualified technicians and demonstrators who provide support for the programme laboratories for staff and students. Safety instructions along with introduction to the use of laboratory equipment is given during the first laboratory session and on an ongoing basis. Moreover, the campus network is supported by an Online Technical Support System which can be used by staff and students to report laboratory problems. The students who met with the Panel praised the facilities, support, and services offered by the university and its various departments, which is also reflected in the senior exit survey results. The Panel appreciates that the College and University provide a comprehensive level of support and guidance to students, which includes technical support that the students are satisfied with. Furthermore, there is a university-wide policy, Academic Advising Regulations, where the Chairperson assigns academic advisors for each student when they enrol in the programme and students choose to seek their advice according to the

students' needs. Nonetheless, senior exit survey results indicate a high dissatisfaction with academic advising. Hence, the Panel advises the College to address the findings of the survey where applicable.

2.11 According to the SER, the Department of Advice and Guidance of the Deanship of Student Affairs at UoB organises an induction day for all newly admitted students, including students transferred from other institutions. During the induction day students are introduced to the university regulations and services, and these are also included in the Student Handbook which is distributed during the induction. Furthermore, students are introduced to the College facilities, including the library. The induction programme also introduces students to the Department of Chemistry, and the Chairperson introduces them to the programme study plan, the faculty and laboratories. In addition, 'the social advisor presents an introduction to the facilities and services provided to the students by the Department of Advice and Guidance'. According to the SER, the Deanship of Student Affairs seeks feedback from the various stockholders which include satisfaction surveys on the induction day for parents, newly admitted and current students. During the site visit, interviewed students indicated their appreciation of the activities in the induction day. The Panel appreciates that there is an induction programme conducted by both the College and the University, which introduces newly admitted students to the needs of the B.Sc. in Chemistry programme and general university regulations. Nonetheless, the Panel notes that the attendance of students in the induction day is low as noted by the department records. Moreover, students who miss the induction are not provided with an alternative and have to rely on information provided in handbooks and the university website. The Panel recommends that the College should provide students who do not attend the induction day with an alternative provision.

2.12 According to the SER, all students are allocated an academic advisor upon enrolling in the Programme and are required to meet their advisors at the beginning of each semester for guidance. The university website and the Student Handbook provide clear information on academic regulations and there are mechanisms in place to identify students who are at risk of academic failure. Each semester, the Deanship of Admission and Registration places students whose GPA falls below 2.0 on academic probation and are not allowed to register more than 12 credit hours. Moreover, during the site visit, the Panel confirmed how the MIS is implemented to identify at-risk students, where the system blocks the online registration option for students whose GPA falls below 2.0. To complete their registration for the semester, at-risk students have to see their academic advisors for advice on course selection and to unblock their online registration option. During interviews with academic advisors, the Panel was informed that tracking the students' progress is a collaborative effort between the Department and the Deanship of Admission and Registration. Furthermore, a range of academic and social support is provided to students under probation, in

collaboration with the Deanship of Student Affairs' Counselling and Guidance Unit. During interview sessions, students expressed their satisfaction with the academic support they receive from their academic advisors and other student services within the university. The Panel acknowledges that there are arrangements in place to identify students at risk of academic failure, however, in light of the low retention and progression rate the Panel recommends that the College should evaluate the effectiveness of the support provided to these students (see the recommendation under paragraph 2.2)

2.13 According to the SER, there are various opportunities for students to expand their experiences and knowledge through informal learning. Moreover, the Panel learnt during the site visit that there is an extensive range of informal learning activities for students, such as, student societies and clubs, cultural and social activities, sporting events, seminars and workshops organised by various entities in the university, career day and 'Peer Tutoring' programme. Furthermore, during their work on their senior projects, students collaborate in groups and expand their organisational, presentation and communication skills. Also, the internship programme provides students with technical knowledge and work ethics through their exposure to relevant industry, and there are some joint publications that have been carried out between students and faculty. Interviewed students, expressed their satisfaction with the variety of extracurricular opportunities available for them to expand their learning. The Panel appreciates the conducive environment and the multitude of opportunities available for students to support informal learning.

2.14 In coming to its conclusion regarding the Efficiency of the Programme, the Panel notes, *with appreciation*, the following:

- There are clear lines of accountability with regards to the management of the programme.
- There is a clear recruitment policy that is consistently implemented and faculty retention rate is high in the Department.
- There are management information systems that are implemented effectively for the management of student and staff information.
- There are clear procedures in place for risk management, back-up and security of information that are implemented in an effective manner to support the programme.
- The College and University provide a comprehensive level of support and guidance to students, which includes technical support that the students are satisfied with.
- There is an induction programme conducted by both the College and the University, which introduces newly admitted students to the needs of the B.Sc. in Chemistry programme and general university regulations.

- The conducive environment and the multitude of opportunities available for students to support informal learning.

2.15 In terms of improvement, the Panel **recommends** that the College should:

- conduct a thorough study to identify the reasons behind the low student progression and retention rates, and develop a plan to mitigate the issue including a full revision of its requirements for English language competencies and the structure and content of the orientation programme, in collaboration with the University
- revise the faculty workload to ensure that it is not excessive in order to ensure faculty effectiveness
- implement a formal induction policy for newly recruited staff members and evaluate its effectiveness
- expand the capacity of the classrooms and the associated laboratories to ensure their suitability for the growing student enrolment, in collaboration with the University
- provide students who do not attend the induction day with an alternative provision.
- evaluate the effectiveness of the support provided to students at risk of academic failure.

2.16 **Judgement**

On balance, the Panel concludes that the programme **satisfies** the Indicator on **Efficiency of the Programme.**

3. Indicator 3: Academic Standards of the Graduates

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

3.1 There are six UILOs that are defined at the institutional level which cover communication, technology competence, critical thinking knowledge and skills, information literacy, responsibility and integrity, and life-long learning. Moreover, the generic Chemistry graduate attributes are embedded in the BSCH programme and are listed as a set of PEOs which are mapped to the UILOs and to the PILOs. The syllabus also contains an explicit and detailed explication of the PILOs and CILOs, and their assessment. The Panel acknowledges that graduate attributes are appropriate and clearly stated for the programme, which are also reflected in each course through the CILOs. As elaborated in paragraph 3.8, graduate attributes are ensured through the achievement of CILOs for each course and their mapping to the PILOs and subsequently to PEOs. Moreover, the direct method for the achievement of CILOs is based on measuring the attainment of each of the CILOs using a variety of assessment methods. The Panel appreciates that graduate attributes are clearly defined in the PEOs and the processes utilized by the Department of Chemistry for the assessment of graduate attributes are consistent and valid, and that graduate attributes are thoroughly ensured through the assessment processes.

3.2 There is a formal university policy on benchmarking that fully describes the purpose and scope of benchmarking activities at the University of Bahrain. During interviews with faculty and senior management, it became apparent that the Department is relying entirely on its CSC accreditation status as the only means of external benchmarking, and the SER also notes that 'The Department's external reference point is the Canadian Society for Chemistry'. Moreover, no other evidence was provided on either internal or external benchmarking of the programme. However, it is noteworthy that curricular changes have been made in response to the CSC accreditation requirements; examples include the addition of courses in biochemistry and computational chemistry and a revision of the physical chemistry courses. Nonetheless, the Panel is of the view, that while the accreditation process is a valuable tool in comparing certain parts of the programme, it does not replace a formal benchmarking process which normally includes admission requirements, progression rates, academic standards and teaching and learning strategies. Moreover, the benchmarking process should involve obtaining useful external benchmarking data formally from other universities of similar size and stature and comparing the programme data with those. A valuable internal benchmarking process would involve comparing the programme's results from surveys of alumni, students, and employers, also comparing retention, year to year progression, graduation rate and measures of student satisfaction with similar data for other programmes within the College and

the University. The Panel recommends that the College should implement formal benchmarking of all aspects of the programme with similar programmes offered locally, regionally and internationally, and in accordance to UoB's policy on benchmarking.

3.3 As noted in paragraph 1.8, the UoB has a set of policies that define assessment strategy. Furthermore, a policy is defined in the university regulations for the review of these policies. These set of coherent and comprehensive procedures and policies are followed by the Department to ensure that assessment is consistent with learning outcomes, that there is consistency and fairness in assessments, that both formative and summative assessment tools are used, that students receive prompt feedback, and that there is internal moderation of the process. Assessment policies are detailed and widely available within the Department. The course specification is distributed to every student at the outset, and it contains a complete breakdown of the assessment policies and procedures for the course, including all course assessment tools and their schedule. Furthermore, students are provided with relevant excerpts of these polices in the Student Handbook, and on the website. Moreover, students can see their progress throughout the semester, and particularly before the final examination, so that they are aware of their potential grade before entering the final examination. Before the final examination, instructors post the assessment percentage of the student's grade for this purpose. Interviewed students were aware of the assessment policies and procedures, and confirmed receiving the course specifications promptly. From interviews and provided evidence, the Panel notes that internal moderation is conducted by the moderation committee, who checks the grading, while no external moderation is conducted in this or any other aspect of the programme. The Panel concludes that the implemented procedures are not completely in alignment with the reported UoB's moderation policy. Hence, the Panel urges the College to ensure that the existing university policy on internal and external moderation is consistently implemented (see the recommendations in paragraphs 3.5 and 3.6). Moreover, the senior project course, CHEMY 499, is evaluated by two internal examiners, in addition to the supervisor. In collaboration with the course coordinators, the Chairperson ensures that assessment policies and procedures are consistently implemented, while the QAAC is tasked with the monitoring of their effectiveness. Based on its observations and discussions with both faculty and students, the Panel concludes that these assessment policies, including the communication with the students concerning their performance, are rigorously implemented within the Department. The Panel appreciates that assessment policies and procedures are defined, consistently implemented, and are made available to students.

3.4 There are mechanisms for the alignment of assessment with the CILOs and PILOs to assure academic standards of graduates. The Course Specification Form, filled out by the instructor at the beginning of the course, ensures that CILOs are aligned with

assessment. The form contains the topics to be covered each week, the CILOs related to the topic, the teaching method to be used, and the assessment tools (tests, quizzes, assignments, etc.). The Panel examined the course files and notes that this procedure is properly implemented in all courses. Random examples of excellent use of this process and consequent appropriate alignment, examined in detail by Panel members, are CHEMY 241 and CHEMY 221. For each course, however, the achievement of course outcomes are monitored by the CILOs Assessment Report which is used to measure the achievement of each CILO based on the percentage of students who achieved the criteria, which is a pass mark between 60% to 70%, for that CILO. For CILOs in which the students do not perform at an acceptable level, the instructor suggests reasons for this and provides an improvement action plan. Moreover, there is a similar PILOs Assessment Report for each course for the evaluation of the achievement of PILOs which bases the achievement of the PILOs on the assessment of CILOs and the mapping of the PILOs to the CILOs. The Panel appreciates that the Department is making a comprehensive effort in assuring the academic standards of graduates through ensuring that CILOs are being achieved and that there is a consistent alignment between CILOs and assessment.

3.5 The Department has developed an Internal Moderation Committee consisting of four faculty members. The members are selected so that each division within the programme (analytical, inorganic, organic, and physical) is represented. The Panel notes that the diverse constitution of this committee ensures that for every course there is an expert member who is well qualified to make judgements concerning courses in his/her field. This committee scrutinises the examinations and syllabi for each course in the programme. Moreover, the committee members examine the mapping of the final examination questions to the CILOs. The committee also looks at the final grades for fairness and consistency and each committee member completes the post moderation form for each course in his / her division. The Panel notes that there is evidence that the process is complete and consistently implemented; an example of the implementation process, concerning CHEMY 231 (Physical Chemistry I) is provided in the December 2016 report of the Committee. Moreover, committee comments are presented to the Chairperson for necessary action. During faculty interviews, the Panel was informed that multi-section courses are marked and graded collectively by all the involved instructors and they all contribute to the setting of assessment tools. Moreover, senior projects are assessed by a panel of three internal examiners, including the project supervisor. The Panel appreciates that the internal post-assessment moderation of the programme's effectiveness is well conceived and thorough, and advises that the College to include pre-assessment internal moderation for setting assessment instruments of all the courses in the programme.

3.6 The SER states that 'external moderation mechanism should be through involving external examiners or external accreditation for the programmes'. Furthermore, the

SER also notes that the University makes use of external examiners only in the assessment of post-graduate studies. The Panel concluded during interviews that the Department relies for external moderation of the programme on the fact that the Chemistry programme has been externally reviewed, on two separate cycles, by the CSC. These reviews included an examination of course portfolios and graded student work in the programme. The Panel acknowledges that the CSC review process and accompanying feedback has led to appropriate curricular changes, which have been noted elsewhere in this Report (see, for example, paragraph 3.2). The Panel is of the view that the accreditation process by the CSC provides a form of external post-assessment moderation but the process involves the review of a sample of courses and is conducted in a periodic manner. Hence the Panel recommends that the College should develop a policy and implement procedures for the external moderation of all its major assessment tools and develop a mechanism to assess its effectiveness.

3.7 During the site visit, the Panel was able to scrutinise samples of students' assessed work which included final and midterm examinations, assignments, quizzes and senior project reports. Examination of a variety of course files led the Panel to the conclusion that the rigor of the courses, the assessment used as well as its grading is entirely appropriate. Based on discussions with faculty members and the data presented, the Panel concludes that there is no apparent grade inflation in the programme. The Panel notes that students' work in the senior project course, CHEMY 499, is comparable with those of other similar institutions and the inclusion of the course in the curriculum allows the assessment of independent thinking and independent work, in addition to critical thinking and other soft skills, as required by the PILOs. Based on this body of evidence, the Panel notes with appreciation that the level of students' achievement of the B.Sc. in Chemistry programme at the University of Bahrain are entirely competitive with those of comparable universities in the region and internationally.

3.8 According to the SER, the Department of Chemistry utilises two methods for the assessment of student learning, a direct and an indirect method. Where the overall direct assessment method is based on the achievement of CILOs which are mapped to the PILOs and these are mapped to the four PEOs. In each course, student performance is assessed by faculty members using a variety of assessment tools and (in some cases) projects. An excel sheet is utilised to assess the achievement of CILOs, where individual assessment tools are mapped to the CILOs and a report is produced based on the number of students passing individual assessments. The various course reports mentioned here and previously in this Report, such as the CILOs and PILOs assessment reports as well as a summary report, help ensure that the intended learning outcomes are achieved. The validity of the assessment at the individual course level is strengthened by the preparation of the course portfolio, which includes the syllabus, assignments, assessments, the course assessment reports, examples of marked

examinations and the grade distributions. The Panel studied a sample of course portfolios and notes a normal grade distribution where the majority of students graduate with GPAs in the range 2.0 to 2.9, while in 2015-2016 more students graduated with higher GPAs compared to the previous year. Moreover, the Panel studied students' senior projects and as noted in paragraph 1.3, 3.7 and 3.11, student work in CHEMY 499, is comparable with those of other similar institutions and include recent research findings. Nonetheless a formal approach to the external independent scrutiny of students' projects is not implemented. During interviews, the Panel was informed that at the programme level, the auditing committee analyses and reviews the academic aspects of the programme including the course portfolios. On the other hand, according to the SER, the Department conducts indirect assessment of student learning through surveys to determine the satisfaction of employers and alumni with the academic programme being successful in achieving its objectives. Nonetheless, and as further elaborated in paragraph 4.8, the low response rate to the employer and alumni surveys renders them virtually useless for gauging their satisfaction with the level of graduates' achievements. However, employers and work supervisors of the internship course, CHEMY 399, with whom the Panel met are delighted with student preparedness and performance. The Panel appreciates that the internal process for ensuring the level of student achievement meeting programme aims and programme intended learning outcomes is comprehensive, well understood, and well designed, and that the graduates' achievements meet the intended learning outcomes of the programme. Furthermore, the Panel acknowledges that the CSC review provides a form of external scrutiny for the programme and its outcome. However, there is a lack of a formal and systematic confirmation of the level of achievement of graduates by external independent scrutiny, as no effective employer and alumni surveys are conducted, the Programme Advisory Committee has not been functional until recently, there is no formal benchmarking process and no external moderation of assessment is in place, as noted in other parts of this Report. The Panel urges the College to develop and implement formal processes to support the confirmation of the level of achievement of graduates through independent external scrutiny, as recommended in paragraph 3.6.

3.9 Fragmented data provided by the Department, which is mainly in row format, suggest that the progression and graduate rates are marginally acceptable, but far from outstanding. The number of students leaving the programme each year is roughly 25% of the intake and 15% of the average number of students registered in the programme. Data on the time taken for students to graduate indicates that several students (33.3%) are apparently taking more than six years to graduate. Moreover, only three students graduated in 2009 in eight semesters and the remaining 21 in the subsequent years took more than eight semesters. The Panel was not provided with evidence that there is analysis of the reasons behind this and whether the reasons are entirely external or reflection of some aspect(s) of the programme. The Panel notes that the SER does not

elaborate on the issue of the first destination of the graduates. However, data in the student Senior Exit Survey for 2014-2015 (and similarly for 2013 to 2015) demonstrate that only 21.4% of the graduates had any job offer, and that (perhaps consequently) the remaining 78.6% were either waiting for employer responses or are contemplating enrolment in a graduate programme. The Panel learnt during interviews that the majority of the female students, who constitute a very large fraction of the currently registered students (87%), are contemplating a career in teaching, but no concrete data were presented on their intended career destinations. The Panel concludes that there is a general lack of systematic reflection on cohort data analysis. Moreover, the absence of external and internal benchmarks, noted in paragraphs 3.2 and 3.8, prevent the Department from making any meaningful comparison with other programmes. The Panel urges the College to implement systematic cohort analysis to study the reasons for the relatively low progression, retention, and graduation rates and develop a plan for mitigation as needed (see recommendation in paragraph 2.2).

3.10 Work-based learning takes place through the required none credit bearing internship course, CHEMY 399, which has policies and procedures to manage its supervision and assessment. To ensure that students have the required background they must have completed 75 credit hours before they are allowed to register for the course. According to the SER, there are two supervisors, one from industry and the other from the Department. The assessment methods include evaluation of students by the course faculty mentor (20%) during site visits, an evaluation by the internship supervisor (40%), and a final report by the student (40%). The Panel notes that student reports and forms used for assessments are detailed and the alignment of the assessment with the leaning outcomes are appropriate. According to the SER, internship placement is arranged by the College Training Committee through the University Training Office but students can select work places based on their interests. Students with whom the Panel met, both those who had taken the course and those who would take it in the future, were enthusiastic about the experience. Students who completed the course confirmed that the faculty mentors visit them on two occasions during training and they have to submit a report on completion. During staff interviews the Panel was informed that the major obstacle faced by the Department is the selection and appropriate training of work supervisors; such that the student receives appropriate and adequate hands on training. Work based supervisors with whom the Panel met were universally complimentary and enthusiastic about the performance of UoB students whom they had supervised. Moreover, they were aware of what is needed from them in their role. The supervisors were all from government ministries, and noted that 'analytical chemists' appear to be in the greatest demand. The Panel acknowledges that the internship course is an essential component of the programme and allows students to learn first-hand the roles of a chemist in the workplace. Moreover, in several cases, the internship had led to a subsequent permanent job offer, as noted earlier in paragraph 1.6. The Panel appreciates that the procedures for the

work based learning component of the programme are implemented and the student learning experience is appropriate, which are aligned with course learning outcomes.

3.11 As part of the requirement for the BSCH programme, students must complete the senior project course, CHEMY 499, and have to submit a report and conduct a presentation at the end of the course. There is a detailed Senior Research Project Handbook developed by the Department to assist students in successfully completing their projects and help staff in their supervision. The Handbook contains appropriate CILOs, suggestions on the selection of the project, details on the requirements in each phase and of the assessment methods. The Handbook also provides a detailed explication of the proper format of the report. Assessment is conducted by the supervisor on all aspects of the project (60%) and by two other internal examiners, where the examiners assess the report (20%) and the presentation (20%). Students can register for the senior project if they have completed 90 credit hours and at least two practical courses (from these CHEMY 312, 322, 332 or 342). Students usually take two semesters to complete the work. A project committee of four faculty members coordinate and help oversee the implementation of procedures for the senior projects in the Department. The Panel notes that responsibilities of both the student and the supervisor are explicitly stated and are available to all students; are complete and appropriate. The Panel examined samples of students' projects and notes that the level of achievement and the topics are appropriate for the programme aims. During the site visit the Panel noted that students and project supervisors are highly satisfied with the experience gained from this course. Moreover, that senior project students are aware of the project requirement and are provided with appropriate training. It is noteworthy that discussions with faculty revealed that recent chemical research is included in the students' preparation for her or his senior research project. The Panel enthusiastically concludes that the requirement of a senior research component, CHEMY 499, is a strength of the programme. The Panel appreciates that there are clear policies and procedures to support the management and assessment of the senior project course, which are effectively implemented and communicated to stockholders.

3.12 The Director Quality Manual-section 3 of the university states that a Programme Advisory Committee (PAC) to be utilised to support the programme and clearly states the terms of reference for the committee which include providing feedback on the professional and labour market needs of the programme. There is a PAC for the BSCH programme comprising of the Department's Chairperson and the quality assurance committee coordinator as well as at least three industry members. According to the SER, 'The purpose of the committee is to evaluate the academic programme in terms of fulfilling the local markets and business needs for employers with rich educational experience and good professional skills that can compete in business and industry. Therefore, the employer's opinion is critical in implementing curriculum needed.' Hence the Panel notes that the anticipated role and function of the PAC are well laid

out and understood. The Panel studied the CVs of the six external PAC members and notes that the composition of the PAC is excellent, representing a broad array of government and private agencies and companies that are employers of chemists. During interviews with PAC members, who were all graduates of the programme, the Panel was informed that the department's Chairperson also chairs the PAC and writes the minutes and that the committee was formed in May 2016. Furthermore, the Panel notes that PAC have suggested introducing some topics in the courses, such as Health and Safety, and regulatory requirements, as well as for the Department to have stronger links with the industry. The PAC had met once since its establishment and it is planned that the Committee will meet once every semester, although it is stated in the SER that meetings are held only once a year. The Panel notes that the minutes of this initial meeting, which took place in November 2016, are complete and valuable, but do not contain any specific discussion of the terms of reference of the committee or the suggestions that the PAC members mentioned during the interviews. Moreover, it is yet to be seen how independently the Committee operates, where the only departmental representatives are the department's Chairperson, who takes the minutes, and the Departmental Quality Coordinator. The Panel acknowledges that the PAC includes discipline experts and employers from diverse sectors of industry and the minutes of the first meeting suggest that the Committee is anxious to be of assistance to the Department. Nonetheless, there has been little opportunity to measure the impact of the Committee's input, and the Panel encourages the Department to maintain the independent operation of PAC and utilise its feedback to systematically inform programme decision-making.

3.13 The Department conducts surveys of alumni, employers, and exiting seniors. As was noted in paragraph 3.8, the response rate to the alumni and employer surveys is so small as to render the data statistically invalid, and the Panel urges the Department to take measures to significantly improve the response rate. As noted in paragraphs 3.9 and 4.8, the senior exit survey outcomes included in the SER contains some disturbing responses; for example, only 21% of the respondents feel that the faculty are knowledgeable and well prepared, and less than 36% agreed that the faculty are appropriately qualified for the courses they teach. Moreover, less than 40% felt that their advisor was well informed about the programme requirements. This was in high contradiction with the feedback received from interviewed students, alumni and SAC members. Interviewed programme management informed the Panel that the Department has not yet analysed these data, and that, these disturbing results may be contributed to data anomalies. As recommended in paragraph 4.8, the Panel urges the College to further develop its system for the collection of structured comments from stakeholders and investigate the reasons behind the presented data that indicate the dissatisfaction of students.

3.14 In coming to its conclusion regarding the Academic Standards of the Graduates, the Panel notes, *with appreciation*, the following:

- The graduate attributes are clearly defined in the Programme Educational Objectives and the processes utilized by the Department of Chemistry for the assessment of graduate attributes are consistent and valid, and that graduate attributes are thoroughly ensured through the assessment processes.
- The assessment policies and procedures are defined, consistently implemented, and are made available to students.
- The Department is making a comprehensive effort in assuring the academic standards of graduates through ensuring that Course Intended Learning Outcomes are being achieved and that there is a consistent alignment between Course Intended Learning Outcomes and assessment.
- There is an internal post-assessment moderation of the programme's effectiveness which is well conceived and thorough.
- The level of students' achievement of the B.Sc. in Chemistry programme at the University of Bahrain are entirely competitive with those of comparable universities in the region and internationally.
- The internal moderation process for ensuring the level of student achievement meets programme aims; and programme intended learning outcomes are comprehensive, well understood, and well designed; and that the graduates' achievements meet the intended learning outcomes of the programme.
- The procedures for the work based learning component of the programme are implemented and the student learning experience is appropriate, which is aligned with course learning outcomes.
- There are clear policies and procedures to support the management and assessment of the senior project course, which are effectively implemented and communicated to stockholders.

3.15 In terms of improvement, the Panel **recommends** that the College should:

- implement formal benchmarking of all aspects of the programme with similar programmes offered locally, regionally and internationally, and in accordance to UoB's policy on benchmarking
- develop a policy and implement procedures for the external moderation of all its major assessment tools and develop a mechanism to assess their effectiveness.

3.16 **Judgement**

On balance, the Panel concludes that the programme **satisfies** the Indicator on **Academic Standards of the Graduates**.

4. Indicator 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.

4.1 Comprehensive institutional policies are established to guide the operations of the College and the programme. These include policies relating to the overall programme, such as quality assurance, assessment and moderation, and benchmarking. In addition, there are detailed policies relating to faculty and staff, such as promotion and appraisal. Other policies related to students, such as plagiarism and student conduct, are introduced to them during the induction day and are available in the Student Handbook. The Panel notes that most of these policies are relatively new, and have not yet been subject to revision. Nonetheless, these policies are sufficient for the effective management of the programme, and are available on the university and the QAAC websites, and that policy review is part of the articles specified within the policies. The Panel appreciates that the framework for effective quality assurance is well established by these policies and the overall goals of quality assurance are well laid out in these policies. The Panel notes from interviews and the provided evidence that there is a university level QAAC, a College Quality Assurance and Accreditation Office (QAA) and a Department Quality Assurance Committee (DAC), which work in unison and are responsible for the consistency in the implementation of the policies across the institution, including the BSCH programme. During faculty interviews, the Panel was informed that the Dean 'ensures that all policies and procedures are emailed to all Chairpersons', and those that pertain the Department of Chemistry are emailed both to the Chairperson and to all faculty. From interview session, the Panel confirmed that academic and administrative staff are aware of the policies and their updates, which enables them to take appropriate action. It is apparent, however, that implementation of policies is not entirely consistent, as an example, and which has been noted under Indicator 2, the teaching load policy is widely neglected. The Panel encourages the College to implement the institution's teaching load policy in a consistent manner.

4.2 The leadership hierarchy is set out and effectively described in the SER, where the programme is led by the Chairperson who is responsible for its overall management. The Chairperson reports to the Dean of the College who in turn reports to the university Vice President for academic affairs. There are numerous committees at the Department level with clear mandates, and decisions of the committees are reviewed by the Department Council. Major Departmental committees include the DAC, the Strategic Planning Committee, and the Curriculum Committee, as well as several others. Interviews and the provided evidence indicate that, although the Chairperson is ultimately responsible for the effective management of the Department, faculty members, through the Department Council and various committees, are involved in

developing recommendations and action plans with respect to the programme. The Panel appreciates that the entire faculty effectively serve as custodians of the academic standards in the programme, which is in line with good practice and supports effective leadership.

4.3 There is a formal Programme Quality Assurance and Enhancement Policy at the university level that includes wide ranging procedures on Quality Assurance (QA) in addition to other policies noted earlier in this Report. Moreover, the University has an Internal Audit Office, which reports directly to the Board of Trustees, as well as the QAAC that are responsible for assisting the programme in reaching university goals. The programme has a clear committee structure, with responsibility for QA management controlled by the Departmental DAC. The work of this committee is supported by the appointment of a college QAA Office and Director, who is a member in the QAAC at the university level. During the site visit, the Panel concluded that the programme has clearly made efforts in implementing the QA procedures, and the assessment and moderation procedures noted earlier in this report, but there have been areas in which this has only recently been achieved and consequently cannot be assessed. An example is the establishment of the external PAC, which was established in 2016 and has consequently met only once. The Panel acknowledges that the committee structure within the Department and the College is appropriate for the effective management of the programme's activities.

4.4 Faculty with whom the Panel met appear to have a comprehensive understanding of their role in ensuring the effectiveness of programme provision. There have been, and continue to be, an impressive array of potentially useful workshops and seminars. Examples include workshops on accreditation, assessment, the NQF, writing and assessing CILOs and PILLOs, and the use of plagiarism-detection software. Attendance at these workshops is stipulated but not mandatory, and there is no data to demonstrate that all faculty have taken advantage of most or all of these opportunities. The Panel established during the site visit that interviewed administrative and academic staff members are well aware of policies and procedures relevant to QA, and their roles in ensuring that these policies are rigorously followed. Hence, the Panel appreciates the staff's broad and deep understanding of the QA system.

4.5 The development of new programmes in the University is regulated under the terms of the 'Academic Programme and Course Development Regulation', which requires that any new course or programme being consistent with the Departmental mission and the College strategic plan. The process for curriculum development and updating includes input from perceived labour market needs as well as from internal groups, and is also subject to review and feedback from external stakeholders. The process involves departmental, college, and university committees, and in the case of new

programmes the consent of the Board of Trustees is also required. The Panel was informed during faculty interviews that apart from the development of some courses, no new programmes have been introduced in the Department of Chemistry since the current programme started. The Panel is satisfied with the prevailing 'Academic Programme and Course Development Policy' being appropriate for the development of new programmes.

4.6 According to UoB's 'Programme Quality Assurance and Enhancement Policy' an annual programme Self Evaluation Report should be submitted to the QAAC. The report is to include evaluation of students' achievement through the assessment of CILOs, PILOs and PEOs. Surveys should be conducted and analysed, and to include; alumni, employers and senior exit. Feedback should be obtained from stakeholders, such as PAC and Student Advisory Committee (SAC). Furthermore, all acquired feedback are to be analysed and results be followed up by an improvement action plan. According to the submitted evidence, the Department generates an annual report which includes information about the programme and some action plans. There are other significant vehicles for internal review, including student and alumni surveys, as well as input from SAC and PAC. Moreover, the Department places heavy reliance on the accreditation processes of the CSC for providing external feedback to the programme. As noted earlier in paragraph 3.8, PAC is new and has not provided systematic external expert input into annual programme reviews. During interviews, the Panel noted that some valuable feedback and suggestions were generated from these activates. Examples include; the revision of PILOs, where an extra PILO was added to incorporate general university courses in the programme, but this update was not implemented in all course specifications, as previously noted in paragraph 3.1. According to the auditing committee report for 2015-2016 'Inconsistent CILO's of the same course taught by different faculty members have been noticed' and the committee recommended that CILO's of the same course should be agreed on by the division. The Panel acknowledges that there is anecdotal evidence of feedback being generated in the programme annual review process, however there is lack of evidence on a systematic approach in their implementation for supporting programme improvement.

4.7 The university's 'Programme Quality Assurance and Enhancement Policy', which was approved in 2015, specifies a periodic programme review to be conducted to ensure the validity of learning outcomes and the extent of their achievement, the effectiveness of the curriculum and to use feedback from external stakeholders in the process. During interviews, the Panel was informed that the internal annual review, which is arranged through the QAAC, feeds into the periodic review of the programme and that these reviews do not cover university-wide functions such as admission and registration, but focuses on areas within the department's bailiwick such as learning resources, facilities, and laboratories as well as the curriculum. According to the SER,

the programme depends largely on CSC for its external review and the periodic reviews timeline is based on the accreditation cycle, where the curriculum was last re-accredited by the CSC in 2015 and the next cycle is due in 2020. The Panel notes that the Department implemented the CSC's recommendations during the process, and some courses were modified. In addition, the Department attempts to obtain feedback from external stakeholders, including employers and alumni. The Panel acknowledges that there is anecdotal evidence of feedback being solicited and included in the programme development. Nonetheless, the Panel recommends that the College should develop a holistic approach to periodic programme reviews and implement it consistently, and urges the College to increase its efforts to make and maintain contact with external stakeholders in order to obtain useful feedback from these sources to inform programme improvements (as recommended in paragraph 4.8).

4.8 The UoB's 'Programme Quality Assurance and Enhancement Policy' states that structured feedback should be collected from stakeholders to inform programme development. During interviews with faculty and students, the Panel was informed that paper-based student surveys are conducted every semester and for every course by the University, which covers faculty performance and general student satisfaction. Though, survey results are provided to faculty, student comments are not relayed. As noted in the SER and the provided evidence, senior exit surveys are conducted regularly. The Survey covers wide ranging aspects such as registration, curriculum, facilities and overall programme experience. Moreover, employer surveys are conducted but, the low response rate to the employer survey renders it virtually useless. According to the SER, 'Regarding the employer survey, the Department had sent the survey to a number of employers but has not yet received any reply'. The alumni survey is encouraging, but here again the number of respondents appears to be relatively small, and according to the SER 'the alumni survey has been sent to ten graduates, and only three of them responded'. Constructive suggestions have been provided by SAC on such matters as, laboratories, role of advisors, relevance of electives, senior project guidance, etc. Furthermore, PAC has been recently formed to provide feedback on the programme's alignment with industry's need but PAC has not been active and had only one recent meeting, as noted before in paragraph 3.12. The Panel concludes that there is evidence of comments being collected from various stakeholders but important outcomes are not used to inform decisions on the programme. As is demonstrated in the evidence, internal review in 2012-2013 showed a number of unsatisfactory results for aspects of the programme, including but not limited to opportunities for improvement, the then current self-evaluation report, support for research and several other notable issues, but this has elicited no response in the SER, and there is no apparent action plan for improvement of or response to these data. Similarly, the required Senior Exit Survey shows some alarming responses, including significant dissatisfaction (21.4% satisfaction) with the preparedness of the faculty and their qualification for the courses that they teach, noted in paragraphs 1.7

and 3.13. Moreover, it is not clear if the results of these surveys are shared with stakeholders. The Panel recommends that the College should further develop its system for the collection of structured comments from external stakeholders, analyse all stakeholders' feedback and use the outcomes to inform decisions on programme improvement on a more holistic form, and provide feedback to stakeholders.

4.9 The opportunities for development of teaching and QA skills are strong, as evidenced by the number of pertinent seminars and workshops provided, as discussed in paragraph 4.4. Moreover, newly graduated faculty members can participate in the PCAP programme, and two from the Department did in the period 2009-2012, and senior faculty members are encouraged to attend workshops conducted as part of the university's Continuous Professional Development programme. Also, there are various specialization seminars that are conducted by the Department, College and University. The Panel advises the College to encourage more chemistry faculty to participate in the PCAP programme. During faculty interviews, the Panel was informed that opportunities for professional scholarly development are less attractive. There is a sabbatical programme, but this is available only to faculty at the rank of Associate Professor or higher, and is temporarily suspended owing to budgetary constraints. Moreover, no chemistry faculty member has received a sabbatical in the past twenty years. The Panel suggest that the College should enhance opportunities for sabbatical and other scholarly development activities. Furthermore, faculty are encouraged to apply for external fellowships, and one chemistry programme faculty member has been successful in this effort, receiving an Erasmus Mundus Scholarship to visit a university in Europe in 2011. In the past, faculty members have received university support to attend a conference if they were presenting a paper. Faculty members with whom the Panel met were not certain that in the present budgetary climate this policy could be continued. The Panel appreciates that numerous opportunities are provided for the professional development of faculty, including the PCAP. Nonetheless, as noted in paragraph 2.5, professional development needs of the faculty is not linked to their appraisal and hence the Panel recommends that the College should employ the outcomes of faculty appraisal to inform the professional development needs of faculty.

4.10 According to the SER, the Department has placed heavy reliance on CSC accreditation for keeping the programme up-to-date with the prevailing labour market needs. While the CSC accreditation have had a positive impact on the academic nature of the programme, the Panel is of the view that there is no reason to believe, or even expect, that CSC has any detailed understanding of the local labour market or its needs. Moreover, faculty members have suggested some new courses that might reasonably be expected to be aligned with the labour market worldwide, but there has been relatively little attempt to investigate the emerging needs of the local labour market specifically, such as, but not limited to, acquiring data or reports from local

government or private institutions on the needs of the labour market. According to the SER, it is anticipated that the members of the external PAC will represent a valuable source of labour market information, but as was noted in paragraph 3.12, this committee has only met once so far and has not yet come to grips with this issue, and the SER states that the Department is yet to receive responses from PAC for a conducted survey related to market needs. The Panel recommends that the College should conduct formal periodic market studies for scoping of the labour market needs to ensure to ensure that the programme is current and meets future needs.

4.11 In coming to its conclusion regarding the Effectiveness of Quality Management and Assurance, the Panel notes, *with appreciation*, the following:

- There is a well-established framework for effective quality assurance which is supported by policies, and the overall goals of quality assurance are well laid out in these policies.
- The entire faculty effectively serve as custodians of the academic standards in the programme, which is in line with good practice and supports effective leadership.
- The staff having broad and deep understanding of the QA system.
- There are numerous opportunities provided for the professional development of faculty, including the PCAP.

4.12 In terms of improvement, the Panel **recommends** that the College should:

- develop a holistic approach to periodic programme reviews and implement it consistently
- further develop systems for the collection of structured comments from external stakeholders, analyse all stakeholders' feedback and use the outcomes to inform decisions on programme improvement on a more holistic form, and provide feedback to stakeholders
- employ the outcomes of faculty appraisal to inform the professional development needs of faculty
- conduct formal periodic market studies for scoping of the labour market needs to ensure that the programme is current and meets future needs.

4.13 **Judgement**

On balance, the Panel concludes that the programme **satisfies** the Indicator on **Effectiveness of Quality Management and Assurance.**

5. Conclusion

Taking into account the institution's own self-evaluation report, the evidence gathered from the interviews and documentation made available during the site visit, the Panel draws the following conclusion in accordance with the DHR/BQA *Programmes-within-College Reviews Handbook, 2014*:

There is confidence in the B.Sc. in Chemistry of College of Science offered by the University of Bahrain.