



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 Mechanical Engineering  
College of Engineering  
University of Bahrain  
Kingdom of Bahrain**

**Date Reviewed: 4-7 April 2016**  
HC085-C2-R085

## Table of Contents

---

Acronyms.....	2
The Programmes-within-College Review Process.....	3
1. Indicator 1: The Learning Programme .....	7
2. Indicator 2: Efficiency of the Programme.....	14
3. Indicator 3: Academic Standards of the Graduates.....	24
4. Indicator 4: Effectiveness of Quality Management and Assurance.....	32
5. Conclusion.....	39

## Acronyms

ABET	Accreditation Board for Engineering and Technology
AIMS	Assessment Information Management System
BS-MENG	Bachelor of Science in Mechanical Engineering
CILO	Course Intended Learning Outcome
CoE	College of Engineering
DAC	Departmental Accreditation Committee
DHR	Directorate of Higher Education Reviews
ILO	Intended Learning Outcome
MIS	Management Information System
NQF	National Qualification Framework
PIAC	Programme Industrial Advisory Committee
PCAP	Postgraduate Certificate in Academic Practice
PEO	Programme Educational Objective
PILO	Programme Intended Learning Outcome
QAAC	Quality Assurance and Accreditation Center
BQA	Education & Training Quality Authority – Kingdom of Bahrain
SER	Self-Evaluation Report
UILO	University Intended Learning Outcome
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 <b>Indicator 1</b> is not satisfied	

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

A Programmes-within-College review of the programmes offered by College of Engineering of University of Bahrain 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 between 4 to 7 April 2016 for the academic programmes offered by the college; these are B.Sc. in Civil Engineering, B.Sc. in Mechanical Engineering, B.Sc. in Process Instrumentation and Control Engineering, B.Sc. in Chemical Engineering, B.Sc. in Architecture, B.Sc. in Interior Design, B.Sc. Electrical Engineering and B.Sc. in Electronic Engineering.

UoB was notified by the DHR/BQA on 22 October 2015 that it would be subject to a Programmes-within-College reviews of its College of Engineering with the site visit-taking place in April 2016. In preparation for the review, UoB conducted its college self-evaluation of all its programmes and submitted the SER(s) with appendices on the agreed date in 10 January 2016.

The DHR constituted a panel consisting of experts in the academic field of Engineering and in higher education who have experience of external programme quality reviews. The Panel comprised 15 reviewers.

This Report provides an account of the review process and the findings of the Panel for the B.Sc. in Mechanical Engineering programme 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 Mechanical Engineering programme. 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 College of Engineering.

## **C. Overview of the College of Engineering**

The College of Engineering, at the University of Bahrain, owes its roots to the Gulf Technical College which was established in 1968 and which later became the Gulf Polytechnic in February 1981. In 1986, Amiri Decree No.(12) was issued to establish the University of Bahrain by a merger of the Gulf Polytechnic and the Bahrain University College. Following this decree, the new organization plan of the University of Bahrain was issued in November 21, 1987. The College of Engineering currently comprises five departments; namely the Department of Chemical Engineering, Department of Civil Engineering, Department of Electrical and Electronics Engineering, Department of Mechanical Engineering and Department of Architecture and Interior Design. The College is currently running a total of (11) academic programmes (8) at Bachelor and (3) at Master levels. The vision of the College of Engineering is to be among the leading colleges in the region and to maintain a respectful international status and reputation by sustaining a high quality of engineering education and scientific research. During the 2015-2016 academic year, there were (143) full time and (23) part-time faculty members supported by (60) administrative staff. The total number of students enrolled in the College at the time of the site visit was (4113) students. The College obtained ABET accreditation for six of its bachelor programmes in 2008 and 2014, these are the B.Sc. in Chemical Engineering, B.Sc. in Civil Engineering, B.Sc. in Electrical Engineering, B.Sc. in

Electronics Engineering, B.Sc. in Mechanical Engineering and B.Sc. in Process Instrumentation and Control Engineering. In addition, the B.Sc. in Architecture obtained National Architectural Accrediting Board (NAAB) accreditation in 2014. Moreover, the College is in the process of obtaining accreditation by the Council for Interior Design Accreditation (CIDA) for the B.Sc. in Interior Design programme.

#### **D. Overview of the B.Sc. in Mechanical Engineering**

The Bachelor of Science in Mechanical Engineering is offered by the Department of Mechanical Engineering. The programme was first implemented in the academic year 1998-1999 and (27) students graduated in the academic year 2002-2003 as the first batch of graduates. During the academic year 2015-2016, there were (17) full time and (6) part time faculty members supported by (12) technicians and administrative staff members. At the time of the site visit, the total number of students enrolled in the programme was (518) students. The total number of graduates to date is (715) graduates. The Programme obtained ABET accreditation in 2008 and 2014.

#### **E. Summary of Review Judgements**

**Table 2: Summary of Review Judgements for the B.Sc. in Mechanical Engineering**

<b>Indicator</b>	<b>Judgement</b>
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
<b>Overall Judgement</b>	<b>Confidence</b>

## 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 of Bahrain has a clear and comprehensive academic planning framework, including defined policies and procedures for the development, monitoring & enhancement, as well as periodic reviews of all its academic programmes. The B.Sc. in Mechanical Engineering programme (BS-MENG) is appropriately designed to produce graduates with a solid foundation in technical knowledge and full preparation for professional careers in mechanical engineering, in both the public and private sectors. The Panel notes that the programme's educational objectives contribute to the achievement of the university's vision of being an internationally recognized university, contributing to the economic vitality and sustainability, in the Kingdom, the region, and beyond; as well as the College of Engineering's Vision to be among the leading colleges in the region offering a high quality engineering education and scientific research. The mapping of the programme PEOs to the university and college strategic statements, as well as strategic goals, is clearly illustrated in the SER. The Panel appreciates that the BS-MENG programme has clear objectives that are appropriate for the type and level of the programme, and are consistent with the institution's strategic goals.
  
- 1.2 The BS-MENG curriculum comprises (139) credit hours distributed as Mathematics and Basic Science courses (35 credit hours), Engineering Science courses (23 credit hours), Engineering Design courses (25 credit hours), Mechanical Engineering Profession courses (38 credit hours), in addition to Humanities and Social Sciences courses (18 credit hours). Students should choose two elective courses (6 credit hours) from the specialised set of elective courses. The Panel notes that the curriculum displays appropriate progression over four academic years *via* a clear set of carefully interlaced pre-requisite courses. The curriculum is also well-structured to provide suitable students workload, ranging from (16) to (18) credit hours per semester. Students confirmed during their interviews with the Panel that they find the workload to be appropriate to achieve the programme's stated outcomes. From the review of provided evidence, the Panel finds that the curriculum is well-designed to facilitate the students' progression from courses that introduce basic sciences and communication skills, to courses that enable students to solve complex engineering problems through computer applications, modelling and numerical analysis, culminating with design courses and a capstone project that provides students with the necessary engineering skills to work in the mechanical engineering industry. The Panel appreciates that the BS-MENG curriculum is well-organized to provide appropriate academic progression with suitable student workload.



- 1.3 Practical experience is systematically built into the curriculum, as the majority of engineering specialised courses include laboratory experiments and course projects. During its interviews with faculty members, the Panel was informed that, by virtue of the Industrial Training I & II (MENG 299, MENG 399) and the Senior Design Project (MENG 490), students are provided with opportunities to work in an industrial setting which enables them to apply their knowledge and develop their technical skills. Students interviewed by faculty members confirmed that they are exposed to theory and practice during their studies through the use of case studies, projects, industrial visits, as well as work-based learning. Upon reviewing provided course files, the Panel notes that, in addition to the specialised engineering skills, the curriculum develops essential skills required by the current labour market; these include general skills such as communication, problem-solving, time-management and teamwork. Moreover, the Humanities and Social Sciences university requirements equip the students with the language, social and legal awareness required to operate within the Gulf region. The Panel appreciates that a balance between theory and practice and between knowledge and skills, is ensured in the academic planning of the curriculum to address the local and regional labour market needs.
- 1.4 The Panel acknowledges the Department's efforts to incorporate oral and written communication skills in several courses to achieve the programme learning outcome of 'an ability to communicate effectively with a range of audience'. However, upon examining samples of project reports during the site visit, the Panel finds that the written communication skills are in need of honing. The Panel's views were also confirmed by the alumni and external stakeholders interviewed by the Panel. The Panel recommends that the College should revise the existing mechanisms for developing the students' written communication skills, to enhance the achievement of the programme's learning outcomes.
- 1.5 The BS-MENG programme conforms to the ABET requirements for accrediting engineering programmes, as well as the guidelines of the UoB Quality Assurance and Accreditation Center as outlined in the IDEAS Handbook. During interviews with faculty members, the Panel was informed that all course specifications are completed using a unified 'Course Syllabus Form' developed by the QAAC to ensure consistent documentation of the courses' content and the achievement of learning outcomes. Upon examining an adequate sample of course portfolios, the Panel notes that the course syllabus forms are well-designed to cover all relevant aspects of the course such as course description, course ILOs and their mapping to the programme ILOs, teaching and assessment methods, weekly lecture topics, key textbooks as well as the contribution of the course to meeting the professional component of the curriculum. The Panel also notes that, in advanced courses, reference is made to current research findings and professional practice to address recent developments in the field of mechanical engineering. During interviews, members of the Programme Industry

Advisory Committee (PIAC) confirmed that they contribute to the design of the technical component of the syllabus by suggesting practical projects and research topics so that students can keep up with current trends in their areas of professional interest. Overall, the Panel finds these arrangement effective for ensuring the appropriateness of the depth, breadth and relevance of the syllabus. The Panel appreciates that the syllabus is fully documented, in alignment with international accreditation criteria, and meets the norms and standards of a B.Sc. in Mechanical Engineering in similar regional and international institutions

- 1.6 The BS-MENG programme has adopted ABET's (13) Programme Intended Learning Outcomes (PILOs) which cover the four categories of A: knowledge and understanding, B: subject-specific skills, C: thinking skills and D: general transferable skills. During interviews, the Panel learned that the PILOs were developed by the Department of Mechanical Engineering, in consultation with internal (Student Council) and external stakeholders (Programme Industry Advisory Committee). The Panel examined the description of the PILOs in detail, as well as their mapping to the Programme Educational Outcomes (PEOs), and found them to be clear, measurable and appropriate for the type and level of the academic degree. The Panel also noted, from site visit interviews, that faculty members have a very good understanding of the development of programme ILOs and their contribution to the achievement of the programme educational outcomes. The Panel appreciates that the BS-MENG programme has appropriately stated PILOs which are well-mapped to the programme educational outcomes, hence supporting the delivery of the programme aims and objectives.
- 1.7 The course Intended Learning Outcomes (CILOs) are clearly stated in the Course Specifications and are made available to internal and external stakeholders. These CILOs are used to guide the students' learning and assessment processes. During interviews, the Panel was informed that the CILOs are developed by faculty members in line with the UoB quality assurance policies and guidelines. Interviewed faculty members were able to give several examples on how they design learning outcomes to address the knowledge and understanding educational domains, with limited practical application. By contrast, at higher levels, the learning outcomes are designed to test critical thinking skills in more depth. The Panel also learned that all CILOs are reviewed by the QAC/DAC committee, and consequently presented at the department council for approval. Upon the review of a wide selection of course files, it was evident to the Panel that the CILOs are, overall, clearly stated and appropriate to the course content and level. The appropriateness of CILOs is further ensured through the ABET accreditation process as well as their mapping to the NQF levels descriptors. The detailed mapping of the CILOs to the PILOs for each of the courses covered in the programme, is clearly illustrated in the SER which the Panel finds to be overall appropriate. The Panel appreciates that the course intended learning outcomes are

appropriately developed, clearly-articulated and effectively mapped to the programme intended learning outcomes.

- 1.8 The BS-MENG curriculum includes work-based learning in the form of two compulsory Industrial Training courses (Industrial Training I: MENG 299 and Industrial Training II: MENG 399), during which students are placed in a work environment in government or private establishments for eight weeks. The industrial training courses aim at exposing the students to real work environments and enable them to apply the theory, knowledge and practical experience they acquired from courses. The Panel notes that the two courses have clearly stated ILOs which contribute to the achievement of the programme ILOs, including the 'ability to function on multidisciplinary teams' (PILO-d), 'ability to communicate effectively with a range of audiences' (PILO-f), and 'an understanding of professional, ethical, legal, security and social issues and responsibilities (PILO-e). There is a clear and appropriate assessment and grading scheme, and achievement is recognised through the award of (1) credit hour for each course. The final grade for the course is distributed as: Company Assessment (20%), Attendance (40%), Academic Supervisor Assessment (10%) and Training Report (30%). The Panel was provided with adequate evidence on the implementation of the Student Assessment Forms (by the industrial supervisor and the academic supervisor) as well as samples of industrial training report. Students interviewed by the Panel indicated that industrial training provides them with opportunities to adapt to local work environments and acquire the necessary professional skills for their specializations. During interviews with members of the Programme Industry Advisory Committee (PIAC) and employers, the Panel learned about how relevant and valuable these opportunities are for the hosting organization as well, as it provides them with the opportunity to select potential future employees. The Panel appreciates that work-based learning is integrated in the curriculum and contributes to the achievement of the programme outcomes.
- 1.9 An explicit teaching and learning policy is not yet in place at university or college level; however, there are common policies incorporating teaching and learning elements that are applied throughout the institution, such as the 'Regulations of Study and Examinations at University of Bahrain' and the Programme Quality Assurance and Enhancement Policy. The SER states that a wide range of teaching and learning methods are utilized by faculty, including interactive lectures, seminars, tutorials, problem-solving, course projects, laboratory exercises as well as e-learning. This was confirmed by the Panel from the review of course files and site visit interviews with faculty members. The Panel appreciates that an appropriate range of teaching methods are implemented to support the attainment of the BS-MENG courses and programme learning outcomes. However, the Panel found, during interviews, that students were critical of the variable use of e-learning, both in terms of some courses not using Blackboard, and the variable quality of those courses using Blackboard. The results of

the Students Exit Survey also indicate a low level of satisfaction with the 'use of computer technology to support learning', with scores ranging from 3.0 to 3.7 (out of 5.0) over the past two academic years. The Panel is of the view that the adoption of e-learning can be enhanced by its written inclusion into a stand-alone Teaching and Learning Policy for the College.

- 1.10 The Panel notes with appreciation that the College provides students with ample opportunities for exposure to professional practice; these include the practical training course, field trips as well as the attendance of professional workshops and seminars by invited speakers. Students are also encouraged to participate in learning, and develop as independent learners, this is particularly evident in the Senior Design Project (MENG 490). Students interviewed by the Panel confirmed that faculty members encourage their participation during lectures and laboratory sessions, through the use of case studies, group assignments and projects. The Panel acknowledges the existing efforts for improving the teaching and learning in the Department, but is of the view that these efforts need to be included within a documented policy framework. The Panel recommends that the College should develop and implement an explicit teaching and learning policy that encapsulates the institution's philosophy of outcome-based education, with more effective integration of e-learning as an integral learning mechanism for students.
- 1.11 UoB has a suite of assessment policies and procedures that govern the design, administration and review of assessment activities across all colleges; these include the Study and Examination Regulations at the University of Bahrain, Assessment and Moderation Policy, Anti-plagiarism Policy and the Programme Quality Assurance and Enhancement Policy. These regulations stipulate the use of a mixture of summative and formative tools, including examinations, projects, case studies, quizzes and presentations, for assessing students' achievements. The final grade for the course constitutes (40%) allocated to the final examination and (60%) for other assessment activities - depending on the nature of the course - as decided by the course instructor and approved by the Department Council. The Panel notes that the assessment policies are adequately disseminated to stakeholders *via* the university website, college publications, course specifications and induction programmes. A review of a selection of course files confirmed that the assessment methods of each category of the CILOs are clearly identified, and that all assessments have clear criteria for marking. It was also evident to the Panel, from site visit interviews, that the staff and students are adequately aware of the assessment policies and related procedures. The Panel appreciates that a well-defined assessment system is in place for the reliable evaluation of students' achievement of learning outcomes.
- 1.12 In line with the Assessment and Moderation Policy, prompt and objective feedback should be provided to students on their assessment results within two weeks from the

date of the assessment activity. Students interviewed by the Panel expressed their satisfaction with the quality of feedback and its timeliness. Students also confirmed that they can request a re-mark of the final examination in line with the documented appeal procedures. The Panel appreciates that appropriate arrangements are in place for providing students with prompt feedback on their achievements as well as the opportunity to appeal their grades.

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

- The BS-MENG programme has clear aims that are appropriate for the type and level of the programme, and are consistent with the institution's strategic goals.
- The BS-MENG curriculum is well-organized to provide appropriate academic progression with suitable student workload.
- A balance between theory and practice and between knowledge and skills, is ensured in the academic planning of the curriculum to address the local and regional labour market needs.
- The syllabus is fully documented, in alignment with international accreditation criteria, and meets the norms and standards of a B.Sc. in Mechanical Engineering in similar regional and international institutions.
- The programme has appropriately stated Programme Intended Learning Outcomes which are well-mapped to the programme educational outcomes, hence supporting the delivery of the programme aims and objectives.
- The Course Intended Learning Outcomes are appropriately developed, clearly-articulated and effectively mapped to the Programme Intended Learning Outcomes.
- Work-based learning is integrated in the curriculum and contributes to the achievement of the programme outcomes.
- An appropriate range of teaching methods are implemented to support the attainment of the BS-MENG courses' and programme learning outcomes.
- Students are provided with ample opportunities for exposure to professional practice; and the development as independent learners.
- A comprehensive set of student assessment policies is in place and is adequately disseminated to relevant stakeholders.
- A well-defined assessment system is in place for the reliable and transparent evaluation of students' achievement of learning outcomes.
- Appropriate arrangements are in place for providing students with prompt feedback on their achievements as well as the opportunity to appeal their grades.

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

- revise the existing mechanisms for developing the students' written communication skills, in order to achieve the programme's learning outcomes.

- develop and implement an explicit teaching and learning policy that encapsulates the institution's philosophy of outcome-based education, with more effective integration of e-learning as an integral learning mechanism for students.

#### 1.15 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 Admission to the BS-MENG programme is determined by the institutional policies and procedures for admission in undergraduate programmes. In terms of these policies, the prospective student must have a high school grade of at least (70%) and pass a personal interview as well as an aptitude test conducted by the University. Although there are no minimum language requirements such as TOEFL/IELTS; students who have a secondary school grade of less than (90%) are required to complete an Orientation English Programme - consisting of non-credited (9) hours per week course (ENGLR 015) - before joining the programme. The Panel notes that as part of the special requirements for the College of Engineering, students coming from private school must pass a standard international examination (IGCSE, GCSE) of at least a grade of (C) particularly in English, Mathematics, any two courses from Physics, Chemistry, Biology or any other scientific subject. During interviews, the Panel confirmed that currently there are no additional admission requirements for the BS-MENG programme. The Panel notes that the admission policies and procedures, including those for transfer students, are clearly stated in the Study and Examination Regulations and are published on the university website as well as in university catalogues. The Panel also notes that the admission policies are periodically reviewed, in light of analysis of students performance and in alignment with international standards. This is evidenced from the introduction of the Aptitude Test as an admission requirement in the last review. The Panel appreciates that clear admissions policies are in place and are periodically revised to recruit students with appropriate profiles for the programme.
- 2.2 According to the SER, during the academic year 2014-2015, there were (518) students registered in the BS-MENG programme, the vast majority (97%) of which are males. Bahraini students constitute (68%) of admitted students, followed by students from GCC & Arab counties (24%), and students from other countries (8%). All students are enrolled full time in the programme. During interviews, the Panel learned that whilst there are no specific examinations designed for admission to the BS-MENG programme, the university entrance examination, the admission interviews, the aptitude test are considered adequate to recruit appropriate students for the programme. The Panel also learned that admission to the BS-MENG programme is competitive, with priority given for students with highest high school grades and who achieve best results in the aptitude test as well as the admission interviews. From provided evidence and site visit interview sessions, the Panel acknowledges that the profile of admitted students is appropriate and matches the programme aims.

- 2.3 The BS-MENG programme is offered and managed by the Mechanical Engineering Department. Clear lines of accountability are in place and a well-managed structure exists with well-defined responsibilities at the department, college and university level. The Dean is responsible for assuring the effectiveness of the educational processes in the College, whereas the Departments' Chairpersons, are in-charge of the programmes management. The Department Chairperson oversees assigned responsibilities, supported by a comprehensive structure of *departmental* committees. The Department has nine permanent committees, which include the Academic committee, Department Accreditation Committee, (DAC), Department Activities, Seminar, & Website Committee, Laboratory and Safety Committee, Library, Textbooks, & Software Committee, Postgraduate Committee, Promotion & Conference/Seminar Attendance Committee, Research & Equipment Committee and the Timetable Committee. From provided documents and interview session, the Panel found strong evidence that all the committees have clear mandates related to the management of the programme and prepare proposals in their respective areas for the chairperson. The Panel also confirmed that the decision-making process follows the hierarchy from the Department Council to the College Council and University Council, with the relevant Councils having ultimate responsibility for decision-making. The Panel appreciates that a well-managed structure is in place for the management of the BS-MENG programme, with well-defined responsibilities and reporting lines.
- 2.4 The Department of Mechanical Engineering has a total (19) full-time faculty members comprising: (3) Professors, (4) Associate Professors, (11) Assistant Professors and (1) Lecturer. From provided CVs and site visit interviews, the Panel notes with appreciation that the academic staff are appropriately qualified and have an appropriate range of specializations to teach the courses in the MENG Programme. The Panel notes that the faculty members earned their PhDs from a wide range of different academic institutions, which brings a wealth of perspectives to the faculty's teaching and research activities. According to the SER, the students:staff ratio is 1:27 which is appropriate in the context of teaching. However, the Panel notes that the average academic staff workload is high which does not allow for large scale research and community engagement activities. During interviews, the Panel learned that the academic load has increased to (4) courses starting from the academic year 2014/2015. Faculty members with administrative or managerial responsibilities, however, teach one course per semester. In its interviews with senior management, the Panel was informed that the College is working towards the recruitment of more faculty members and Teaching Assistant in the MENG Department. The Panel encourages the College to continue its efforts in improving the staff: student ratio *via* an increase in the number of scholarships to carry out PhD studies as well as replacement plans for faculty members who have recently retired or resigned.



- 2.5 With regards to research, the SER states that the Department is focused on three scientific disciplines addressed by three groups: these are: Thermal Science Group, Solid Mechanics Group, and Manufacturing Materials and Industrial Group. From provided evidence, the Panel finds that the profile of current academic research of the faculty is fairly satisfactory. However, during interviews with faculty members, the Panel learned that the high teaching staff workload does not allow sufficient time for activities such as research, or community engagement. The Panel recommends that the College should provide appropriate support to faculty members to enable them to enhance their research efforts.
- 2.6 The University of Bahrain has a well-established approach for recruitment, selection, appointment and retention of staff. Policies and guidelines are in place and the recruitment process is detailed in the SER showing the steps undertaken both by the Department and the College for recruiting new staff members. During interviews, the Panel learned that vacancies are advertised on the university website after which received CVs are studied by the Department Recruitment Committee for a thorough scrutiny and ranking of candidates. The Committee's recommendations for appointment are then discussed in the Department and College Council Meetings, with final approval of selected candidates being made in the University Council. This was confirmed by the Panel from the study of provided evidence. The Panel appreciates that recruitment procedures are implemented in a transparent manner in alignment with institutional policies and procedures. There are no formal approaches with regards to the retention of academic staff. During the interviews, the Panel was informed that retention is encouraged through incentives and participation in international conferences. Moreover, the Panel learned that induction of new staff is performed informally at a programme level. The Panel recommends that the College should develop formal mechanisms for the induction of newly-appointed academic staff as well as for the retention of high performing faculty members.
- 2.7 There are comprehensive 'Academic Promotion Regulations' with a set of criteria including research, community service, in addition to the teaching and learning activities. However, faculty members interviewed by the Panel indicated that the processing of promotion applications was very lengthy and slow. Some staff also indicated that they are unable to fulfil the current promotion criteria due to increased teaching load which slows the promotion process on the average. In its interviews with senior management, the Panel was informed that the University is working towards streamlining the promotion process. The Panel notes, from provided data, that only one faculty member has been promoted in the Mechanical Engineering Department over the past five academic years. The Panel recommends that the College should review the promotion procedures to significantly shorten the time required to process promotion applications. With regards to staff appraisals, the Panel notes that the process currently involves student evaluation *via* student surveys at the end of each

semester. During interviews, the Panel was informed that a comprehensive evaluation of academic staff performance is only conducted at the time of promotion, and contract renewal for non-Bahraini staff members. The Panel confirmed that there is no provision for annual staff appraisals that are linked to staff professional development. The Panel recommends that the College should develop and implement an annual comprehensive appraisal system for all academic staff that identifies and supports areas for professional development.

- 2.8 The College of Engineering utilizes the institutional Management Information System (MIS) to guide informed decision-making in the management of its academic programmes. The SER provides details of the system's major sub-components including: Online Registration, Timetable Preparation, Academic Advising, E-learning, Human Resources, Training and Quality Assurance. During the site visit, the Panel confirmed that the MIS is efficiently maintained by the University Information Technology (IT) Center to ensure availability of the system's components to all stakeholders. In its interviews with academic and administrative staff, the Panel learned that the Department makes use of the MIS to provide up-to-date information about the students and faculty members of the programme. For example, the Department has access to a wide range of data such as student records, advising records, faculty records, examination marks, tracking ordered laboratory equipment, and quality assurance reports. Students interviewed by the Panel confirmed that the system allows them to download the necessary forms required for online registration and other aspects related to the management of their learning. The Panel notes that access to the MIS is subject to password compliance, whereby staff and students have restricted access to the system *via* a secured login protocol. During interviews, the Panel heard several examples of the use of reports generated by the MIS for decision-making in the Department. The Panel appreciates that an effective Management Information System is utilized by the Mechanical Engineering Department to support the BS-MENG programme functions and decision-making processes.
- 2.9 Appropriate policies and procedures are in place to ensure the security of learners' records, and the accuracy of results. At university level, it is the responsibility of the Deanship of Admission and Registration to secure and safeguard all student related records, in both electronic and hardcopy. At college level, academic departments are responsible for keeping records of all examinations, project reports, student grades, attendance as well as related policies and procedures. During interviews, the Panel learned that academic staff are responsible for the retention of marked assessments and for submission of students' grades to the Department Chairperson. The Department Chairperson is responsible for confirming grades and submitting these to the Dean of College, for confirmation and submission to the Deanship of Admission and Registration. The SER describes the procedures in place to ensure the security of learner records. During the site visit interviews and the campus tour, the Panel

confirmed that copies of all critical records are maintained at different levels by the Deanship of Admission and Registration and in the Department of Mechanical Engineering. The Panel notes that a robust system is in place for the backup and disaster recovery of student records, with clearly prescribed periods for retention and back-ups. In addition, an electronic backup is executed every semester by the IT Centre. From its interviews with the IT Centre staff, the Panel is satisfied that the security of records is ensured through clearly defined mechanisms for authorization, storage of data, privacy of information, and the use of appropriate security tools. The Panel appreciates that a robust system, including effective policies and procedures, is consistently implemented, to ensure security of learner records and accuracy of results.

- 2.10 The College of Engineering is currently located in the UoB Isa Town Campus. During the site visit, the Panel toured the departmental and college facilities including the teaching classrooms, specialised laboratories, computer laboratories, library, staff offices, the food court, and venues for extra-curricular and sporting activities. The Panel observed that the classrooms are all equipped with computers and smart boards for use by instructors, with internet connectivity provided in every office and laboratory in all the college buildings. The Department of Mechanical Engineering has seven specialised laboratories; these are the Heat Engines Laboratory, Fluid Mechanics Laboratory, Heat Transfer and Refrigeration Laboratory, Dynamics and Systems Laboratory, Solid Mechanics Laboratory, Materials Laboratory, and Mechanical Engineering Workshop. The Panel notes that the laboratories are adequate for student numbers and are appropriately equipped. The departmental laboratory infrastructure is further supported by (13) College Computer laboratories equipped with a total of (290) computers and one multimedia projector in each laboratory. Blended learning is facilitated by the extensive multimedia facilities and installed Ethernet, Fibre Optic and Wi-Fi networks. Major maintenance of the laboratories and laboratory equipment is carried out by specialised personnel. Students interviewed by the Panel indicated that they are satisfied with the currently available facilities in the Department. The Panel notes with appreciation that the available facilities are sufficient in number and specifications to meet the needs of the BS-MENG programme staff and students.
- 2.11 In addition to the Central University of Bahrain Library located in the Sakhir Campus, the Isa Town Campus has a library devoted to the College of Engineering faculty and students. The visit to the library confirmed that an appropriate range of textbooks, journals and e-resources are available for the Mechanical Engineering programme and are to an international standard. The number of printed books related to the Mechanical Engineering program is about (590) in English. In addition, students have access to (438) fully-searchable e-reference books and e-journals in the field of Mechanical Engineering from the digital library portal. The online catalogue (Sirsi Dynix) enables students to locate and borrow books. The presence of a digital library

also makes it possible for students to remotely access journals and e-books. Students interviewed by the Panel expressed their satisfaction with the library services such as the online system, the study rooms, and the common study area. The Panel appreciates that the library is fit for purpose with a range of resources and services that meet the needs of the staff and students of the BS-MENG programme.

- 2.12 A tracking system is in place to determine the usage of laboratories, classrooms, and library resources. A laboratory engagement timetable and an 'enrollment list' is provided by the registration office for each semester, to enable the department to manage the utilization of laboratories and classrooms for the programme. During interviews with administrative and academic staff, the Panel learned that the laboratory technicians keep a daily schedule of their laboratory usage as they are normally used for laboratory sessions of most of the courses. With regards to the library e-learning and e-resources, the Panel was informed that the library and e-learning center are mainly responsible for tracking the usage of these resources and tracking reports are provided for the department upon request. Samples of e-learning tracking reports were provided to the Panel. During the site visit tours, the Panel noted the timetabling and attendance sheet system displayed in the department's teaching facilities. In addition, Computing Usage Timetable were displayed in all college computer laboratories. During interviews, the Panel heard several examples of how tracking records are utilized for the evaluation of the usage of the Department's resources; for example, determining the need for opening new sections or purchasing new laboratory equipment. The Panel acknowledges that an adequate tracking system is utilized for the evaluation of the usage of the Mechanical Engineering Department's resources.
- 2.13 The University of Bahrain provides student support activities at many levels; these include, laboratory support, library support, e-resources, guidance and counselling, as well as health care. A description of the extensive array of student support activities available to the programme's students is reported in detail in the SER. During the site visit, the Panel confirmed that the department laboratories have technical support team of technicians who maintain these laboratories and provide students with required support in the operation of equipment. However, students interviewed by the Panel indicated that current laboratory support, through one technician in each laboratory, is not adequate. The Panel recommends that the College should increase the current laboratory support to adequately address the students' needs.
- 2.14 The Zain e-Learning Centre also provides a range of services and courses to support students in use of learning technologies. The Library provides a range of services and support for students, both generic and through subject librarians. Support for students includes: library induction; information literacy training; and workspaces in the library, including for students with special needs. General guidance and support

comes within the responsibility of the Deanship of Student Affairs, with support organised in service areas: Student Activities; Student Services and Developments; Students Advice and Guidance; and Training and Development. The Panel acknowledges the impressive range of workshops organized for students on a wide range of topics including: leadership development, computer literacy, scientific report writing, life skills and psychological skills development. The Panel also notes that the Career Counselling Office provides a range of support services for students including: student career guidance; professional liaison; supporting students' practical skills; and marketing students to the jobs market, including job-shadowing and professional workshops. The University Health Clinic provides comprehensive on-campus healthcare to students. The appropriateness of available support, as documented in the SER, was confirmed by the Panel in interviews with administrative staff. Students interviewed by the Panel also expressed their satisfaction with the range of support services available to them and indicated that with the planned move to the new campus, they will benefit more from full, easy access to all of the University's facilities. The Panel appreciates that an extensive range of support services is provided to the programme's students to enhance their learning experience.

- 2.15 At the beginning of each academic year, the Deanship of Students Affairs and the Deanship of Admissions and Registration organize an induction day for all newly admitted students at UoB. During this induction, students are informed about the academic facilities and services at the University, as well as the academic rules and regulations. In addition, an overview of the different educational and social activities is also provided to students, along with orientation programme publications. During interviews, the Panel was informed that different student bodies also participate in the induction of new and transferred students to familiarize them with the activities of student clubs and societies. In addition to the general university orientation, the College of Engineering organizes an induction day during which students meet with the academic and administrative staff members of the Department. During its interviews with staff members, the Panel learned that college induction includes an overview of the college and departments by the Dean and Chairperson, the introduction of academic programme plans by academic advisors, as well as touring of college facilities. The Panel appreciates that a comprehensive induction programme is provided for newly admitted students at university, college and department levels. However, the Panel notes, from provided evidence, the low number of students who attended the induction day in the academic year 2013-2014, constituting only (49%) of total students admitted in the College of Engineering. During interviews, the Panel learned that currently the induction programme is not compulsory and that the College is working towards addressing this issue. The Panel notes that the Department has identified, in its programme improvement plan, an improvement goal to 'improve the student induction' with clear action steps including that: (1) the induction programme should be made compulsory to all students (2) the induction programme

should be held more than once at the beginning of the semester to accommodate all the new students. The Panel concurs and recommends that the College should enhance students' attendance during orientation and implement appropriate provisions for those students who cannot attend the induction day.

- 2.16 An institutional Academic Advising Framework that details the responsibilities of academic advisors and the processes for tracking the students' academic progress is in place. In line with this framework, students are required to meet their advisors at the beginning of each semester to guide them in selecting courses that ensure the successful and timely completion of their studies. The Panel notes the elaborate scheme that has been put in action to allow effective implementation of the advising system; this includes the Academic Advising website, Advising Tool, as well as the appointment of a Chief Departmental Advisor who provides guidance to other faculty advisors. 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. The Academic Warning & Academic Dismissal roles are clear and widely published in the University's website. The online Academic Advising System includes an electronic tracking system which enables advisors to record the advice information for each student. With regards to at-risk students, the Panel acknowledges that there are appropriate policies and procedures to identify students at risk of academic failure and enable timely interventions. A new feature has recently been introduced in the advising system to block at-risk students (with GPA of less than 2.0) from registration unless they meet their academic advisors. During interviews, the Panel learned that a range of academic and social support is provided to students under probation, in collaboration with the Deanship of Student Affairs' Counseling and Guidance Unit. The Panel noted from its interviews with students that the peer-mentoring scheme and related programs - such as Life Learning, Steps to Success, Generation Teaching - provide students with opportunities to improve their academic performance. Students interviewed by the Panel indicated that they are overall satisfied with the quality of academic advising they receive. The Panel acknowledges that an appropriate system for academic advising has recently been developed, including processes to identify and support at risk students.
- 2.17 The SER details the extensive range of informal activities provided for students to expand their knowledge and experience outside the classrooms and laboratories; these include student societies and clubs, cultural and social activities, as well as sporting events. In addition, students are encouraged to attend workshops and conferences conducted locally and internationally. This was confirmed during interviews with faculty members, as well as administrative staff from the Deanship of Student Affairs. Students interviewed by the Panel were very positive about these wider opportunities, and indicated that they appreciate arrangements made by the College for them to participate in competitions and obtain professional certificates. The site visit revealed

to the Panel that the general environment in the College and Department is conducive to informal learning. The Panel appreciates that the wider learning environment, including the comprehensive range of activities and resources, enable the programme's students to effectively engage in informal learning experiences.

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

- Clear policies for admission to the BS-MENG programme are widely communicated, consistently implemented and periodically revised.
- A well-managed structure is in place for the management of the BS-MENG programme, with well-defined responsibilities and reporting lines.
- The academic staff are qualified and have an appropriate range of specializations to teach the courses in the BS-MENG Programme.
- A well-established staff selection and recruitment system is implemented in a transparent manner in alignment with institutional policies and procedures.
- An effective Management Information System is utilized by the Mechanical Engineering Department to support the programme functions and decision-making processes.
- A robust system, including effective policies and procedures, is consistently implemented, to ensure security of learner records and accuracy of results.
- The available facilities are sufficient in number and specifications to meet the needs of the BS-MENG programme staff and students.
- The library is fit for purpose with a range of resources and services that meet the needs of the staff and students of the BS-MENG programme.
- An extensive range of support services is provided to the programme's students to enhance their learning experience.
- A comprehensive induction programme is provided for newly admitted students at university, college and department levels.
- The wider learning environment, including the comprehensive range of activities and resources, enable the programme's students to effectively engage in informal learning experiences.

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

- provide appropriate support to faculty members to enable them to enhance their research efforts
- develop formal mechanisms for the induction of newly-appointed academic staff as well as for the retention of high performing faculty members
- review the promotion procedures to significantly shorten the time required to process promotion applications
- develop and implement an annual comprehensive appraisal system for all academic staff that identifies and supports areas for professional development

- increase the current laboratory support to adequately address the students' needs
- enhance students' attendance during orientation and implement appropriate provisions for those students who cannot attend the induction day.

## 2.20 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 The BS-MENG programme adopts the use of ABET's PILOs as broad statements that describe 'graduate attributes'. The 13 PILOs are set out in the SER and include, in addition to knowledge and general skills, outcomes that relate to core functional areas of mechanical engineering such as 'the ability to work professionally in thermal and mechanical systems and manufacturing processes' and 'the ability to realize the design of a mechanical system, component or process'. The Panel finds that these outcomes adequately express the required graduate attributes of a MENG programme graduate entering the employment arena. Moreover, these PILOs are aligned to the Programme Educational Objectives (PEOs) and are then mapped to the course ILOs in a rigorous manner, hence ensuring the achievement of the required graduate attributes. The range of assessment methods employed by the department to evaluate the achievement of learning outcomes are detailed in the SER, and include direct assessment methods using rubrics and performance indicators as well as indirect assessment *via* surveys and evaluations that provide indirect information on the achievement of the PILOs. The Panel appreciates that appropriate graduate attributes are embedded in the programme learning outcomes statements and that valid assessment methods are used to measure their achievement.
- 3.2 An institutional benchmarking policy has recently been developed in 2015 to ensure that the University's performance is comparable to national and international standards and as a means of improving its performance. The Panel finds this policy to be overall appropriate clearly stating the policy purpose, scope, procedures statements and support procedures, as well as management and implementation responsibilities. In line with this policy, the QAAC in collaboration with the university Vice Presidents and Deans are responsible for the management of various aspects of benchmarking. In its interviews with senior management, the Panel learned that a number of external reference points have been utilized in the benchmarking of the B.Sc. in Mechanical Engineering programme standards, these include the ABET criteria for engineering programmes accreditation, specific requirements set by the American Society of Mechanical Engineers (ASME), as well as the BQA National Qualifications Framework (NQF) level descriptors. The Panel notes that the benchmarking activities have resulted in improvements to the programme, particularly in the curriculum design. The Panel appreciates that formal processes are in place to enable UoB to evaluate its performance against peer institutions and professional bodies to further enhance its academic standards. In line with the UoB Benchmarking Policy, the Panel recommends that the College should extend its systematic benchmarking of the BS-

MENG programme, beyond ABET, to include similar programmes in reputable regional and international institutions.

- 3.3 As indicated in section 1.8 of this report, the College assessment strategy is guided by a number of institutional policies that are made available to staff and students; these include the Study and Examination Regulations at the University of Bahrain, Assessment and Moderation Policy, QAAC Assessment Strategy, Anti-plagiarism Policy and the Programme Quality Assurance and Enhancement Policy. Procedures for ensuring the consistent implementation and monitoring of these policies are also given. During interviews, the Panel learned that an 'Examination Moderation Committee' and a 'Grade Distribution Committee' are established within the department with a clear mandate to monitor the implementation of students' assessments in all courses. In addition, a departmental 'Quality Assurance Committee' conducts regular reviews of the course files, at the end of each semester, to ensure that faculty members are adhering to the assessment guidelines. From the review of these committees' reports as well as course portfolios, including samples of moderated assignments and examinations, the Panel concludes that assessment procedures are overall consistently applied, as will be further detailed in upcoming sections. The Panel appreciates that effective procedures are applied in the Mechanical Engineering department to ensure the consistent implementation of students' assessment policies and their regular review.
- 3.4 Assessment strategies implemented in the MENG department emphasize the importance of effective alignment of students' assessments with the course intended learning outcomes, so as to ensure the programme's academic standards. Appropriate mechanisms have been developed by the QAAC to ensure the constructive alignment between assessment methods and course ILOs, and are implemented in the BS-MENG programme. During interviews, faculty members indicated that a 'Course Assessment Matrix' is utilized in every course to demonstrate how each CILO are to be assessed *via* a range of assessment methods including examinations, quizzes, student presentations, and projects. The Panel was also informed that regular workshops are conducted by the QAAC to enhance the teaching staff's understanding on the importance of testing the ability of students to use a range of intellectual skills to prove that they have attained a particular learning outcome. The Panel reviewed samples of course files during the site visit, and noted that each course specification includes information on how each category of its ILOs is to be assessed *via* appropriate assessment methods. The Panel also noted that internal moderation is implemented by the 'Examination Moderation Committee' to verify that assessment methods are appropriate to the level of the assessed learning outcomes. The Panel appreciates that a rigorous system is implemented to ensure alignment of students' assessment methods with the intended learning outcomes in all BS-MENG programme courses.

- 3.5 The MENG department implements the institutional internal moderation system for setting assessment instruments and grading students' achievement, as detailed in the SER and the 'Assessment and Moderation Policy'. An 'Examination Moderation Committee' is established annually to ensure the effective implementation of internal moderation policies and procedures. Faculty members interviewed by the Panel indicated that pre-assessment moderation is conducted for all summative assessments to ensure that the assessment design is aligned with article (56) of the 'Regulations of Study and Examinations at the University of Bahrain'. The Panel was informed that in the case of multiple-section courses, the course coordinators oversee the setting of the examination papers, in coordination with other faculty members teaching the course, whereas in single-section courses, the course instructor is responsible for preparing the examination paper, and may consult with other faculty members specialised in the same field. In addition, post-assessment moderation of completed students' work is carried out by the 'Examination Moderation Committee' to verify that assessment criteria have been consistently and fairly applied, and that the students' marks are fairly and accurately awarded. The moderation results are consequently submitted to the Department Chairperson, and are used to inform improvements in the assessment processes within the department. A review of course files by the Panel confirmed that they included Assessment Moderation Forms, confirming the moderation of both the setting of the examination paper and the marking. The Panel appreciates that the institutional mechanisms for the internal moderation of summative assessments are consistently implemented in the BS-MENG programme. However, the Panel notes that formative assessment tools, such as quizzes and presentations, are not subject to a formal internal moderation. The Panel recommends that the College should develop and implement an equally effective system for the internal moderation of formative assessment tools, as well as for single section courses.
- 3.6 Mechanisms for the external moderation of students' assessment are included in the recently developed 'Assessment and Moderation Policy'. These include (1) the participation of external examiners in the assessment of undergraduate capstone courses and postgraduate theses, (2) accreditation and external reviews by professional organizations. During interviews with faculty members, the Panel confirmed that only the Senior Project includes participation of an external examiner, whereas other courses were subjected to external scrutiny by the ABET evaluator during the accreditation visits. In its interviews with senior management, the Panel was informed that programmes that have not been accredited over the past three years are required to involve external examiners to externally moderate the students' assessments, in line with the 'Assessment and Moderation Policy'. While the Panel appreciates the involvement of external examiners for the Senior Project and the evaluation of the examinations carried out by the ABET evaluators during the accreditation visit, the Panel is of the view that the College should adopt a formal dedicated external moderation system of assessments in all courses, regardless of

whether the programme has recently been accredited or not. The Panel recommends that the College should expand the current external moderation mechanisms to include effective moderation of all courses, as a means of further assuring the BS-MENG programme's academic standards.

- 3.7 The Assessment and Moderation Policy stipulates that 'student assessment should reflect learning outcomes and academic standards'. In this regard, the College implements a number of appropriate mechanisms to ensure that the level of students' achievement is appropriate to the level and type of the programme. According to the SER, a 'Course Assessment Matrix' is employed in all courses to map the students' grades in different course assessment components with the CILOs, and a benchmark of (70%) of students achieving above (60%) is an indication of the students successfully achieving the CILOs. Moreover, a set of Performance Indicators (PIs) for all PILOs have been developed to enable the direct assessment of the PILOs through the use of rubrics. During interviews, faculty members indicated that in seeking ABET accreditation, and mapping of courses against the BQA National Qualifications Framework, the Department further ensures that the course assessments are at an appropriate level. An examination of the course files by the Panel confirmed that a range of assessment tools, including examinations, assignments, projects, are employed in alignment with the type and level of course learning outcomes. The Panel also notes that the level and quality of students' achievement is satisfactory and aligned with the programme's learning outcomes. The Panel appreciates that an appropriate level of students' achievement is ensured in the BS-MENG programme, through the implementation of effective mechanisms.
- 3.8 The level of graduates' achievement is ensured through the implementation of the 'University-wide Outcome-based Assessment Process', whereby appropriate mechanisms are implemented to evaluate the extent to which the graduates meet academic standards that have been set as programme intended learning outcomes. As indicated earlier, students' assessments are aligned with the Course ILOs, and a 'Course Assessment Matrix' is employed to determine the successful attainment of the CILOs. An 'Articulation Matrix' is then used to ensure that students achieve the PEOs and PILOs *via* the CILOs. The achievement of Programme ILOs is confirmed internally by the University's QAAC which conducts regular audits of course portfolios at the end of each semester. On the other hand, the ABET accreditation process, which involves the scrutiny of assessed students work, provides an external verification of the academic standards. From the data provided in SER, the Panel notes that the PILOs assessment results clearly indicate the achievement of programme outcomes. It was also evident from external stakeholders' interviews that the standard of the qualification is viewed favourably in the regional labour market. Moreover, the accreditation of the BS-MENG programme by ABET further attests to the quality of graduates' achievements. The Panel appreciates that the rigour of academic standards

is assured so that the achievements of the graduating students are consistent with similar programmes, in the region and internationally.

- 3.9 The College, in collaboration with the Registrar's Office, monitors the students' drop-out rates and retention rates, as well as average length of study on a regular basis. Statistics provided in the SER indicate that the average length of study in the programme has decreased from (5.45) in the 2012-2013 to (4.85) in 2014-2015, with the majority of students (40%) completing in (5) years. The Panel notes an improvement in the students' dropout rates from (13.5%) in 2012-2013 to (6%) in 2014-2015. The Panel also notes the high retention rate of the programme's students (94% in 2014-2015). The Panel finds these numbers, for a four-year engineering programme, to be overall acceptable; however, it is of the view that there is a need for the College to conduct a systematic cohort analysis depicting ratio of admitted students to successful graduates, year-on-year progression and first destination of graduates. Faculty members interviewed by the Panel also recognized the importance of student cohort information for planning purposes and decision making. The Panel recommends that the College should conduct a comprehensive cohort analysis to enable comparison of these essential data with those of equivalent programmes in Bahrain, regionally and internationally.
- 3.10 Students are required to take two compulsory Industrial Training courses (MENG 299 and MENG 399) for a period of two months, after completing (45) and (85) credits, respectively. Guidelines for the management and evaluation of these courses are in place and are detailed in the Industrial Training Manual, including the training objectives, procedures for enrolling in the training programme, as well as criteria for exemption from training for those who have work experience. The implementation of these guidelines was confirmed during site visit interviews during which the Panel learned that Practical Training Office at the College of Engineering is responsible for the allocation of students to various training placements. The Training Programme is administered and coordinated by a Training Committee. Supervisors are assigned to supervise students and at the end of training, students are required to write a report and make a presentation assessed by the trainer and the supervisor. The Panel was provided with adequate samples of Student Assessment Forms, Industrial Supervisor Assessment Forms and Students Presentations. Interviews with students, trainers and staff revealed that these training course are highly valued as they constitute an essential mechanism for the development of the students' professional skills required by industry. The Panel appreciates that a well-managed work-based learning programme is in place, and contributes to improved graduate attributes.
- 3.11 The BS-MENG programme curriculum includes a Senior Project Course (MENG 490) in the final year of studies aimed at developing the student's ability to apply theoretical knowledge and practical skills in solving engineering problems within a

professional, team-oriented environment. Appropriate policies and procedures for the supervision of the Senior project, are in place and are clearly documented in the Senior Project Handout. In its interviews with faculty members, the Panel learned that the departmental Senior Project Committee is responsible for setting the standards for the supervision of the Senior Projects and monitoring the progress in their implementation. Project supervisors also indicated that they schedule supervisory meetings with the students every other week, and regularly submit formal reports to the Senior Project Committee. During interviews, senior students and recent alumni expressed their satisfaction with the arrangements for the management of their senior projects, as well as the support they receive from their supervisors. During the site visit, the Panel reviewed samples of senior projects and found them to be of good quality, with appropriate use of Plagiarism detection software. The Panel notes that evaluation forms are utilized for the assessment of senior projects using appropriate assessment rubrics. The Panel also notes the involvement of external examiners in the evaluation of these projects. Faculty members interviewed by the Panel considered the Senior Project to be a vital element in helping the students achieve the programme's learning outcomes. Moreover, employers indicated to the Panel that they value the Senior Project highly, as it equips the students with essential transferable and engineering skills that prepare them for real life mechanical engineering practice. The Panel appreciates that effective mechanisms are consistently implemented for the supervision and evaluation of the senior project, consonant with its vital role in the curriculum.

- 3.12 The Mechanical Engineering department has a functioning Programme Industrial Advisory Committee (PIAC) comprising an appropriate range of representatives from the business, industry and government sectors with a clear stake in the quality of the programme's graduates. The PIAC's role as well as the rules governing the selection of committee members, committee's size, and frequency of meetings are clearly detailed in the QAC Director Quality Manual. The PIAC is mandated to meet at least once a year to advise and provide constructive feedback to enhance the employability of the programme's graduates. Evidence of the involvement of PIAC members in supporting and offering suggestions for programme improvement was provided to the Panel. During interviews, PIAC members confirmed that their feedback is used systematically to inform decision-making in the programme, and expressed their opinion that the PIAC should meet more frequently, particularly to discuss the proposed move of the College to the new campus. The Panel appreciates that a functioning advisory board is in place and is actively involved in improving the BS-MENG programme delivery, and the quality of its graduates.
- 3.13 The Mechanical Engineering Department conducts annual Alumni and Employers surveys as part of the College's ongoing efforts to evaluate the satisfaction of the main stakeholders regarding the quality of the MENG programme graduates. Provided

evidence on the latest evaluation of the PEOs by employers reflects general satisfaction with the graduate attributes with scores ranging from (82%) for PEO-2 to (86%) for PEO-3. By contrast, the alumni rating of the PEOs is lower, ranging from (66%) for PEO-1 to (74%) for PEO-2. The Department, in its SER, recognizes the need to revise the survey instruments to collect better focused data for improvement purposes and is included as an initiative in the programme improvement plan. The Panel acknowledges this initiative, and encourages the College to utilize the outcomes of the Alumni Survey for programme development and improvement of graduates profiles. Interviews conducted with employers and alumni during the site visit indicated a high level of satisfaction with the standards of the graduates. The Panel appreciates the overall satisfaction of alumni and employers with the standards of BS-MENG programme graduates.

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

- Appropriate graduate attributes are embedded in the programme learning outcomes statements and that valid assessment methods are used to measure their achievement.
- Formal processes are in place to enable UoB to evaluate its performance against peer institutions and professional bodies to further enhance its academic standards
- Effective procedures are applied in the Mechanical Engineering department to ensure the consistent implementation of students' assessment policies and their regular review.
- A rigorous system is implemented to ensure alignment of students' assessment methods with the intended learning outcomes in all B.Sc. in Mechanical Engineering programme courses.
- The institutional mechanisms for the internal moderation of summative assessments are consistently implemented in the B.Sc. in Mechanical Engineering programme.
- An appropriate level of students' achievement is ensured in the BS-MENG programme, through the implementation of effective mechanisms
- The rigour of academic standards is assured so that the achievements of the graduating students are consistent with similar programmes, in Bahrain and internationally.
- A well-managed work-based learning programme is in place, and contributes to improved graduate attributes.
- Effective mechanisms are consistently implemented for the supervision and evaluation of the senior project, consonant with its vital role in the curriculum.
- A functioning advisory board is in place and is actively involved in improving the BS-MENG programme delivery, and the quality of its graduates.

- There is strong evidence of graduate and employer satisfaction with the standards of BS-MENG programme graduate profile.

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

- extend its systematic benchmarking of the BS-MENG programme beyond ABET, to include similar programmes in reputable regional and international institutions
- develop and implement effective mechanisms for the internal moderation of formative assessment tools
- expand the current external moderation mechanisms to include effective moderation of all courses, as a means of further assuring the BS-MENG programme's academic standards
- conduct a comprehensive cohort analysis to enable comparison of these essential data with those of equivalent programmes in Bahrain, regionally and internationally.

### 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 Institutional policies, procedures and regulations are published on the university website and made known to the different constituencies. The Panel notes that policies, procedures and regulations are appropriate in scope for the institution, college and BS-MENG programme. During interviews, the Panel learned that the implementation and continuous revision of these policies is mainly the responsibility of the Quality Assurance and Accreditation Centre (QAAC). Implementation is managed through clear identification of responsibilities, with key roles at relevant levels: University - Director of QAAC; College Dean and Director of College QA Office; Department - Chairperson and faculty teaching specific courses. The Panel appreciates that a comprehensive and well-documented set of institutional policies, procedures and regulations are in place and are applied effectively and consistently in the programme and across the College. The Panel acknowledges the College's efforts in communicating institution's policies and academic regulations to staff and students during induction programmes and in departmental council meetings. However, the Panel notes that some faculty members interviewed by the Panel were not aware of the recently developed policies. The Panel recommends that the College should enhance the mechanisms for communicating new institutional policies to respective stakeholders to ensure the effective application of these policies.
- 4.2 As indicated earlier (see section 2.3), the hierarchy of management at the University, College and Department levels is appropriate and adequate to ensure effective management of the BS-MENG programme. Academic responsibilities are clearly defined at appropriate levels: University, College, Department, Programme and individual courses. The Dean of the College of Engineering and the Department Chairperson have key leadership roles. In addition, faculty members are actively involved in decision-making through a comprehensive structure of departmental committees that consider every academic and administrative matter, including curriculum, examinations, recruitment and promotion. The Department has primary responsibility for academic standards, with the Department Council approving all routine academic decisions. Decisions involving radical change or affecting other departments or programmes are referred to College and / or University Council (s). During interviews, the Panel heard several examples confirming that a hierarchy of experienced leadership exists at different levels and that each level is aware of its responsibilities and accountabilities. The Panel appreciates that the BS-MENG programme is managed in a way that demonstrates effective and responsible leadership.

- 4.3 There is a clear Quality Assurance (QA) management system at all levels within the institution. At university level, this includes the role of the Adviser to the President on Academic Quality, and the Academic Accreditation Committee which schedules routine quality audits. At college level, key parts of the system are: the role of the Dean, the College Quality Assurance Office, and the College Accreditation Committee, while at the programme level, the Department Accreditation Committee (DAC) is mainly responsible for implementation of the quality system. The Panel notes that at the department / programme level, there is a very strong focus on assessment of PEOs, PILOs, and CILOs, informed by an appropriate range of inputs including students' grades and stakeholders' views. During interviews, the Panel confirmed that the existing QA structure effectively communicates the information and monitors the implementation of the quality assurance measures set by the University. The QA system is supported by an Assessment Management Information System (AIMS) which houses all the evaluation data and reports of all academic programmes. In addition, a comprehensive Quality Assurance Committee (QAC) Director Manual describes in details the quality policy, the structure of the committee as well as including all quality forms that are needed for QA, such as meeting agenda forms, different survey forms, course syllabus forms, etc. The QA management system is monitored by systematic reporting upwards through committees, including the Department Accreditation Committee, Department Council, and College Accreditation Committee. The Panel acknowledges that the organization of the QAC and DAC in the College of Engineering involves members with different qualifications that ensure appropriate implementation and monitoring of QA policies. The internal audit function is also a component of the quality assurance management system and it plays an important role in quality assurance monitoring. In its interviews with senior management, the Panel heard about plans to audit the College Engineering in the future. The Panel appreciates that a comprehensive quality assurance management system is in place and is consistently implemented and monitored.
- 4.4 According to the SER, several workshops and meetings have been conducted to discuss quality assurance issues, so that all academics have sufficient understanding of their role in ensuring the quality of provision within the department. A list of these workshops as well as evidence of material presented were made available for the Panel. During interviews, faculty members clarified to the Panel their roles in quality assurance including the maintenance of academic standards through achievement of PEOs, PILOs and CILOs; ensuring students' awareness of learning outcomes; and the completion of Course Assessment forms. The Panel also heard from support staff in the laboratories and the library about their roles in supporting student learning. In addition, senior staff interviewed by the Panel emphasized the role of international accreditation (ABET) processes as well as the ongoing review and evaluations by the university QAAC in promoting QA culture within the College of Engineering since 2005. From provided evidence and site visit interviews, it is evident to the Panel that

there is a shared understanding amongst academic and support staff members about the importance of the QA system. The Panel appreciates that the College provides capacity-building opportunities for academic and administrative staff to enhance their understanding of quality assurance concepts.

- 4.5 There are structured policies and procedures in place for the development of new academic programmes. The introduction of new programmes is achieved *via* well-defined processes involving the Departmental Curriculum Committee, Department Council, College Curriculum Committee, the College Council, and ultimately the University Council. During interviews, the Panel learned that these processes emphasize several aspects such as: the relevance of the suggested programme for the labour market, graduates' employment, feedback from internal and external stakeholders, as well as alignment with external accreditation benchmarks. The Panel was also informed that the Department of Mechanical Engineering has not recently developed new academic programmes. The Panel acknowledges that rigorous policies and procedures are in place to ensure that a newly developed programme is relevant, fit for purpose, and complies with institutional regulations.
- 4.6 There are clear arrangements for annual internal evaluation of curriculum, teaching and other academic issues. The guidelines for the preparation of internal Self Evaluation Reports and Improvement Plans for each programme are outlined in the 'Quality Manual for DAC Committees'. The cycles for annual evaluations are explained in the Programme Quality Assurance Policy and comprises assessment of Programme Educational Objectives (PEOs), Programme Intended Learning Outcomes (PILOs) and Course Intended Learning Outcomes (CILOs). The QAAC coordinates quality assurance activities with other departments and colleges by providing the appropriate templates for the SER and action progress reports. In its interviews, the Panel learned that faculty members are required to prepare annual course reports which include: an analysis of students' achievement and grades with reference to the CILOs; analysis of pre-requisites; and quantitative results from students' evaluation. These reports are submitted through departmental committees and discussed at the Department Council. The Panel also heard several examples of improvements made in light of these evaluations, including the removal or introduction of new courses, improvement in teaching or changes in course pre-requisites. The Department is also required to submit internal SERs, along with an improvement plan to the university QAAC, which, in turn, submits a summary report for all academic programmes to the University Council. Moreover, the QAAC releases information on key assessment statistics to all programmes in the University. This practice is commendable. The Panel appreciates that appropriate arrangements for annual internal programme evaluation are implemented to inform programme improvements.

- 4.7 Arrangements for the periodic external and internal reviews of programmes are stipulated in the Programme Quality Assurance and Enhancement Policy. In line with this policy, academic programmes are reviewed every five years *via* a process that incorporates both internal and external feedback, as well as mechanisms for implementing improvement recommendations. During interviews, the Panel learned that preparations for external accreditation by ABET is considered an important catalyst for internal reviews, which promotes improvements in the programme. These reviews have resulted in ABET accreditation of the programme in 2008 and 2014. The Panel notes that the SER submitted in 2014 clearly deals in a comprehensive way with all aspects of the programme, such as admission policy, registration procedures, learning resources and promotion policy as examples. The Panel also notes that the Department systematically obtains feedback from internal and external stakeholders, including faculty members, students, alumni, as well as members of the PIAC. During interviews, employers and PIAC members indicated that periodic reviews of the programme ensure its relevance to the labour market and alignment with international standards. The implementation of internal and external reviews is monitored by the DAC and QAO to ensure consistency and adherence to the University Quality Assurance Center guidelines. The Panel appreciates that a rigorous system is implemented for the periodic review of the BS-MENG programme to ensure its relevance and continuous improvement. However, the Panel notes that the self-evaluation report submitted for the current review by BQA is in need of improvement. Whilst the Panel acknowledges that some areas for improvement are identified in the SER; the Panel finds the SER to be overall descriptive, rather than reflective. Senior University and College QA staff interviewed by the Panel acknowledged this limitation across the (8) SERs prepared for the Programmes-within-College Reviews of the College of Engineering programmes. The Panel recommends that the College-level QAO and University-level QAAC should develop formal mechanisms to support drafting of self-evaluation reports that emphasise reflective evaluation, and to promote sharing of good practice in developing SERs across the College and University.
- 4.8 Mechanisms are in place for the periodic collection and analysis of feedback from internal and external stakeholders, consistent with the Programme Quality Assurance and Enhancement Policy. The University QA procedures require that a range of surveys are systematically conducted; these include Student Course Evaluation, Senior-Exit Survey, Alumni and Employer Surveys. From provided evidence, the Panel notes that the quantitative results from these surveys are statistically analysed and considered by academic staff, the Department Chairperson, and the Dean. The Department Chairperson has the key responsibility for ensuring that the survey results are included in the Department action plan during the review process, and that improvement actions are implemented. Examples of improvements made in light of these surveys are included in the SER and have been confirmed during interviews with

different stakeholders. The Panel appreciates that the structured comments collected from stakeholders' surveys are analysed, and the outcomes are used to inform mechanisms for programme improvement. Following the interview with external stakeholders, the Panel confirmed that the results of these surveys are conveyed to them through the PIAC meetings. In general, there is a high level of satisfaction amongst stakeholders regarding the mechanism adopted to communicate with the department, getting feedback and implementing recommendations. However, the Panel notes that whilst comprehensive student surveys are performed that deal with every aspect of the learning and teaching operations; the outcomes from these surveys are not currently communicated to students. During interviews, students indicated that, in general, these results are not made public to them and they were not informed about changes resulting from their comments. In its interviews with senior management, the Panel was informed that the University is keen to take this issue forward, and that QAAC is planning an online survey tool to enhance the mechanisms for the communication of survey results. The Panel recommends that the College, in collaboration with QAAC, should enhance the current survey tools to ensure that the students' survey outcomes are transparent and effectively communicated to all stakeholders.

- 4.9 The SER states that all faculty members are expected to remain current in their discipline through scholarly and professional development activities. During interviews, the Panel was informed that the College of Engineering is committed to provide administrative and academic staff members with adequate opportunities for ongoing professional development. Faculty members interviewed by the Panel confirmed that they are encouraged by the College to participate in local, regional, and international conferences and training programmes. The Training and Development Office at the University is responsible for the identification of workshop topics and their communication to all colleges so that administrative and academic staff select the topics, as appropriate to their needs. From the provided list of professional development activities attended by the programme faculty, the Panel finds that the topics and number of activities are overall satisfactory, especially the topics on quality assurance and assessment. Following interviews with senior management, the Panel learned about the trend at university level towards increasing provision of continuing professional development for staff, including compulsory development for specific groups. Currently there are two target groups: First, newly appointed academic staff, including those returning with PhDs, are expected to complete the Postgraduate Certificate in Academic Practice Programme (PCAP) which is aligned to the UK Higher Education Academy Fellowship. Second, academic staff who are not scoring highly in student evaluations; are mentored and peer reviewed by more qualified and experienced faculty members. The Panel acknowledges that the College provides opportunities for the professional development of faculty members; however, there was insufficient evidence that these activities are linked to formal training needs

analysis or staff appraisal. For the professional development programmes to be more effective, the Panel recommends that the College should develop and implement a strategy for staff development, linked to staff appraisal, to enhance the professional capabilities of faculty members in the pursuit of their academic careers.

- 4.10 In scoping the labour market, the Programme Industrial Advisory Committee (PIAC) comprised of industry experts in the discipline, provide industry input to the curriculum and market needs. The SER also cites references to studies by the Bahrain Higher Education Council (HEC) as another element in scoping of the labour market. In addition, results of Alumni and Employers' surveys provide valuable feedback regarding the contemporary demands and requirements of the labor market. In its interviews with employers; training courses supervisors; senior project external examiners; and members of the PIAC, the Panel noted the commitment of these external stakeholders in supporting the currency and relevance of the programme to the local labour market, and their enthusiasm to support future development. The Panel also acknowledges the responsiveness by the Department to suggestions from PIAC about the introduction of new courses to reflect the developing labour market. The Panel finds these initiatives to be appropriate and may be further expanded to ensure that the programme is aligned with the labor market needs. The Panel recommends that the College should conduct specialised scoping studies to ensure that BS-MENG programme remains up-to-date.
- 4.11 In coming to its conclusion regarding the Effectiveness of Quality Management and Assurance, the Panel notes, *with appreciation*, the following:
- A comprehensive and well-documented set of institutional policies, procedures and regulations are in place and are applied effectively and consistently in the programme and across the College.
  - The BS-MENG programme is managed in a way that demonstrates effective and responsible leadership.
  - A comprehensive quality assurance management system is in place and is consistently implemented and monitored.
  - The College provides capacity-building opportunities for academic and administrative staff to enhance their understanding of quality assurance concepts.
  - Appropriate arrangements for annual internal programme evaluation are implemented to inform programme improvements.
  - A rigorous system is implemented for the periodic review of the BS-MENG programme to ensure its relevance and continuous improvement.
  - Structured comments collected from stakeholders' surveys are analysed, and the outcomes are used to inform mechanisms for programme improvement.
- 4.12 In terms of improvement, the Panel **recommends** that the College should:

- enhance the mechanisms for communicating new institutional policies to respective stakeholders to ensure the effective application of these policies
- develop formal mechanisms to support drafting of self-evaluation reports that emphasise reflective evaluation, and to promote sharing of good practice in developing these reports across the College and University
- enhance the current survey tools to ensure that the students' survey outcomes are transparent and effectively communicated to all stakeholders
- develop and implement a strategy for staff development, linked to staff appraisal, to enhance the professional capabilities of faculty members in the pursuit of their academic careers
- conduct specialised scoping studies to ensure that BS-MENG programme remain up-to-date.

#### 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 Mechanical Engineering of College of Engineering offered by the University of Bahrain.**