



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

Directorate of Higher Education Reviews Programme Review Report

**University of Bahrain
College of Engineering
B.Sc. in Process Instrumentation and Control
Engineering
Kingdom of Bahrain**

Site Visit Date: 8 – 10 May 2023

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Acronyms

ABET	Accreditation Board for Engineering and Technology
BQA	Education & Training Quality Authority
CGPA	Cumulative Grade Point Average
CILO	Course Intended Learning Outcomes
DHR	Directorate of Higher Education Reviews
HAZOP	Hazard and Operability Analysis
HEC	Higher Education Council
HoD	Head of Department
ICENG	Instrumentation and Control Engineering
ISA	International Society of Automation
NQF	National Qualifications Framework
PAC	Programme Advisory Committee
PEO	Programme Educational Objective
PICENG	B.Sc. in Process Instrumentation and Control Engineering programme
PILO	Programme Intended Learning Outcome
QA	Quality Assurance
QAAC	Quality Assurance and Accreditation Center
QAC	Quality Assurance Committee
QAEC	Quality Assurance Executive Committee
SAC	Students Advisory Committee
SER	Self-Evaluation Report
SIS	Student Information System
SO	Student Outcome
UILO	University Intended Learning Outcome
UoB	University of Bahrain

I. Introduction

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

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

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

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

Standard 1: The Learning Programme

Standard 2: Efficiency of the Programme

Standard 3: Academic Standards of Students and Graduates

Standard 4: Effectiveness of Quality Management and Assurance

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

Table 1: Criteria for Judgements

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

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

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

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

II. The Programme's Profile

Institution Name*	University of Bahrain
College/ Department*	College of Engineering/ Department of Chemical Engineering
Programme/ Qualification Title*	B.Sc. in Process Instrumentation and Control Engineering
Qualification Approval Number	Board of Trustees Decision No. (2001/12) dated 12 May 2001
NQF Level	8
Validity Period on NQF	5 years from the date of re-validation
Number of Units*	49 Units
NQF Credit	616
Programme Aims*	<ol style="list-style-type: none"> 1. Engage in productive careers in a broad range of the process instrumentation and control engineering profession in both the public and private sectors. 2. Engage in ongoing professional development activities by pursuing graduate studies and /or other learning opportunities. 3. Advance in responsibility and leadership in their careers.
Programme Intended Learning Outcomes*	<ol style="list-style-type: none"> 1. Identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics. 2. Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors. 3. Communicate effectively with a range of audiences. 4. Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts. 5. Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives. 6. Develop and conduct appropriate experimentation, analyze, and interpret data, and use engineering judgment to draw conclusions.

	7. Acquire and apply new knowledge as needed, using appropriate learning strategies.
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* Mandatory fields

III. Judgement Summary

The Programme's Judgement: Confidence

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

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

IV. Standards and Indicators

Standard 1

The Learning Programme

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

Indicator 1.1: The Academic Planning Framework

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

Judgement: *Addressed*

- The B.Sc. in Process Instrumentation and Control Engineering programme (PICENG), offered by the College Engineering of the University of Bahrain (UoB), is structured based on a clear academic planning framework that is in line with the academic and administrative bylaws, Regulations for Offering and Developing Academic Programmes and Courses, Quality Manual, and Assuring Learning as described in the provided evidence. The PICENG programme has also been accredited by the Accreditation Board for Engineering and Technology (ABET) since 2008 and was reaccredited in 2014 and 2020. The Panel is of the view that the programme is fit for purpose and aligned with international standards and practices.
- The Panel noticed that there was no mention in the Self-Evaluation Report (SER) of the identification of potential academic risks and how the Department of Chemical Engineering deals with them. The Panel confirms the existence of annual and periodic reviews which ensure that the quality of the programme, its delivery and academic standards. However, the Panel recommends that the College should introduce a risk register, which includes the risks related to the quality of the programme, its delivery and academic standards, and ensure that such a register is regularly updated, and the identified risks are effectively dealt with.
- The programme's title is concise and clearly addresses the qualification type, level, and content. This is reflected in all the related documents such as the programme's specifications, university's website, transcripts and certificates. The PICENG programme adheres to the qualification design requirements of the National Qualifications Framework (NQF), as it was placed on the NQF Level 8 in 2019. The Panel learned during

the interviews that, as a result of the periodic review of the programme, the qualification title will be changed to B.Sc. in Instrumentation and Control Engineering (ICENG) with the curriculum and courses revised as described in the Existing Programme Amendment Form approved by the Department Council on the 1st of March 2023. These changes were commended by various stakeholders during the interviews.

- The PICENG programme follows a well-defined development and assessment process where the Programme Educational Objectives (PEOs) are directly mapped to the university's mission, and regularly revised in line with the requirements of UoB and ABET. The Panel is of the view that the PEOs are aligned with the mission and goals of the College of Engineering which contribute to the achievement of UoB's mission and strategic goals.

Indicator 1.2: Graduate Attributes & Intended Learning Outcomes

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

Judgement: Addressed

- The University Intended Learning Outcomes (UILOs) specify the graduate attributes at the institutional level, which are reflected in the Programme Intended Learning Outcomes (PILOs) and referred to in the Department as Student Outcomes (SOs). These attributes are also reflected in the PICENG PEOs 1-3, which are mapped with the PILOs. However, the Programme Specifications document shows that UILO6 'Life-Long Learning', although reflected in PEO2, is not mapped with the PILOs; therefore, the Panel advises the College to correct this to be in line with the PEOs mapping with the SOs.
- The PILOs are clearly stated in the Programme Specifications document, meets the NQF requirements and are accurately mapped to the PEOs and the UILOs. The Panel noted that the PILOs are identical to ABET's 1-7 Engineering Programmes Criteria. The Panel is of the view that the PILOs are appropriate for the programme type and level.
- All the Course Intended Learning Outcomes (CILOs) are well written, measurable and appropriate for the level of the courses as evidenced in the course syllabi and the assessment sheets. The CILOs are also appropriately mapped to the PILOs and reflect the topics and content of each course.

Indicator 1.3: The Curriculum Content

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

Judgement: *Partially Addressed*

- The PICENG programme has 138 credit hours spread over a four-year period. The provided evidence shows that the programme is tailored taking into consideration the multi-disciplinary requirements needed to produce technically competent graduates with necessary industrial automation skills. The programme has undergone major improvements since its inception, these include the introduction of 'Engineering Ethics' (PICENG 400) course and 'Report Writing' (ENGL 242) course, which strengthen the PILOs and SOs (3&4); in addition to improvements with relation to course structure, teaching methods, student assessment, software and textbooks. The pre-requisite flowchart is comprehensive, showing the interconnection between courses and student credit load per semester. The Panel noticed that 'Process Safety' (CHENG465) course is an elective, while safety is an essential skill required by all Process Instrumentation engineers and should be incorporated in the compulsory courses. The Panel, hence, recommends that the College should add the 'Process Safety' (CHENG465) course to the compulsory courses and ensure that all students are introduced to safety engineering, including Hazard and Operability Analysis (HAZOP).
- Evidence was provided on conducting benchmarking against regional and international programmes as well as the International Society of Automation (ISA) requirements as defined by ABET and benefitting from their results in improving the curriculum. Furthermore, feedback from students, alumni, employers and the Program Advisory Committee (PAC) was considered for enhancing the programme. The improvements include, for example, incorporating core courses in automation, networking, machine learning and cyber security, and introducing new specialised topics in the field of Instrumentation and Control. These changes were discussed during the PAC meeting of 19th June 2022, and considered in the new study plan, which has been put into force starting from the academic year 2022-2023. The Panel acknowledges that the programme benefitted from the benchmarking exercise and the external stakeholders' input, which was also well reflected during the interviews with PAC, employers and alumni.
- The PICENG curriculum comprises appropriate theoretical course contents combined with laboratory and project work. Almost all courses in the 300 and 400 levels, require students to work in groups on real-life case projects involving direct interaction and feedback from the industry. Students are also asked to submit technical reports and give presentations, to enhance their communication skills. During the virtual interviews with

alumni, PAC and employers, the Panel concluded that PICENG graduates possess very strong theoretical skills but lack the necessary soft skills (e.g. communication and leadership skills). Furthermore, the Student Advisory Committee (SAC) and PAC recommended enhancing the practical skills of graduates by equipping laboratories with latest technologies (see Indicator 2.3). In the same vein, the Student Exit Survey of 2021-2022 revealed low satisfaction score ranging from 61.4% to 78.8%, with the low score being for access to practical sessions. Thus, the Panel recommends that the College should review the delivery of English communication skills of students, and their leadership and managerial skills throughout the programme with the aim of improving these soft skills, in addition to increasing student's access to practical sessions to further enhance their practical skills.

- The Panel examined the Programme Specifications and Course Specifications and found that the curriculum is appropriate in terms of the depth and breadth. The textbooks and references listed in the course syllabi are appropriate to the taught courses. However, there are several instances where the book editions are old (some date back to 1995). Therefore, the Panel recommends that the College should review the course syllabi and update the textbook and reference section with recent book editions.

Indicator 1.4: Teaching and Learning

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

Judgement: Addressed

- The programme adheres to the university's Teaching and Learning Policy, approved in 2018, which includes suitable teaching and learning methods, that are based on several principles including: constructive theory at the programme and course levels; effective teaching strategies based on student involvement and stimulation; effective assessment of student learning; and continuous review and development of teaching approaches.
- All course syllabi are revised every semester to include the teaching methods that will be applied. The PICENG programme adopts a variety of teaching and learning methods to achieve the PILOs and SOs. These include, class lectures, practical laboratory sessions, industrial site visits, seminars, projects and case-based learnings. The Panel is of the view that the employed teaching methods are sector standard and foster critical thinking, problem solving, and reasoning.
- The Department has developed e-learning practices especially during the Covid-19 period where online teaching has been applied. As per the SER and the provided evidence, the academic staff uses MS Teams, Blackboard and other online tools to support their

teaching. UoB has also issued Quality Assurance Guidelines for Precautionary Period, where clear guidelines are included for the online teaching, learning and assessments.

- It was evident during the interviews with faculty and senior management that the students get exposed to some engineering practices through seminars and site visits as part of their lifelong learning process. Furthermore, real-life applications in the form of project courses allow the students to demonstrate their design skills, which are evaluated by the faculty and industrial advisors from the local industry. In addition, after completing 85 credit hours of course work, students must spend at least six weeks of industrial training, working on real industrial problems. Moreover, the programme comprises a number of project-based courses, which are designed to trigger students' critical thinking and they involve a high level of research that could lead to journal publications as explained during interviews.
- The curriculum enables the concept of learning by use of formal, informal, and non-formal learning activities, particularly with respect to industrial focus on project courses, additional workshops and seminars by local industrialists, involvement in outreach activities with alumni and local industry. Furthermore, students participate in laboratory activities that are often evolved into quality research papers that are formally published. The Panel appreciates the variety of life-long learning activities provided to students.

Indicator 1.5: Assessment Arrangements

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

Judgement: Addressed

- The programme adheres to several assessment policies and procedures, which are specified in the Regulations of Study and Examination, Moderation of Assessment Regulation, Teaching and Learning Policy and Assuring Learning. In addition, the University-wide Assessment Handbook summarises the outlines and rationale for UoB's Outcomes-Based Assessment Process and describes the step-by-step implementation of such assessment. All assessment policies are available online for all stakeholders and follow standardised processes in the classroom, laboratory or externally. Overall, the Panel is satisfied with the PICENG assessment framework.
- The course syllabi documentation provides a breakdown of the assessment methods used, a learning schedule, and the mapping of the CILOs to PILOs and SOs. Marking criteria are defined for coursework and groupwork and students are provided with prompt feedback on their progress.

- Student assessment takes place in both formative and summative practices and *via* a suitable range of methodologies. Evidence of assessments and feedback in project related courses were made available to the Panel. The Panel notes that the marking process is transparent and fair. Rubrics are used to assess student performance in project-oriented courses. Internal pre- and post-moderation evidence were also provided; however, there was no proof of external moderation implemented for all courses (see Indicator 3.3).
- The PICENG programme follows the university Anti-Plagiarism Regulations, Study and Examinations Regulations and Students Misconduct Bylaws, which provide further details for the disciplinary action and student appeal process. During the interviews with the senior management, it was confirmed that cases of cheating are taken seriously and referred to the Student Misconduct Committee. Students have the right to appeal as supported by the provided evidence.

Standard 2

Efficiency of the Programme

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

Indicator 2.1: Admitted Students

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

Judgement: Addressed

- As per the SER, the PICENG programme adheres to the university's Admissions Policy, which clearly outlines admission requirements. The Admissions Policy does not discriminate on the basis of gender and accommodates students with special needs. The Policy is consistently implemented according to the statistics over the past five years and is made public. The Policy requires a minimum Cumulative Grade Point Average (CGPA) of 70% in the secondary school certificate from all applicants. The SER mentions the use of an aptitude test, and evidence was provided on the rubric used for the aptitude test; however, according to the SER, the validity of such a test has yet to be investigated. Thus, the Panel advises that the results from the aptitude test be reviewed periodically for appropriateness and validity.
- There is evidence of an orientation programme for newly admitted students. As per the Admissions Policy, all accepted students take a one-semester orientation programme, which includes English language courses. Students with CGPA of 90% and above in the secondary school certificate are exempted from the orientation programme. Exemptions are also granted for students who have passed the TOEFL test with 500+ points or equivalent. During the interviews, the Panel was able to confirm that remedial support measures are in place and adequate.
- As per the SER and the Study and Exam Regulations, credit transfer is allowed for students if he or she has completed a comparable course with a minimum grade of C. However, statistics shows that there were no transfer students during the last five years.
- According to the SER, UoB routinely examines the admission requirements based on current student performance and regional and international benchmarks. The aptitude

test is an example of a recently adopted modification. As shown from the provided evidence, the Admissions Policy was last revised in 2022.

Indicator 2.2: Academic Staff

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

Judgement: Partially Addressed

- As per the SER, UoB has adequate policies and regulations for the recruitment, induction, appraisal, and promotion of academic staff, which are consistently implemented in a transparent manner. According to the SER, the faculty evaluation form has been incorporated into the annual evaluation procedure of the Civil Service Bureau. The faculty promotion is based on the performance and significant accomplishments of the faculty in teaching, research, and services. The SER states that several faculty members have submitted applications for promotion. Nonetheless, at the programme level, only one faculty member has been promoted since 2018.
- The SER mentions that the Department encourages the faculty to conduct quality scientific research and cites some evidence, which were either empty folders or irrelevant. There is no evidence that either the College or the Institution have a research plan, and this was confirmed during interviews. However, the Panel noticed the existence of policies for both internal and external funding for the faculty research. Furthermore, the Panel found that the faculty evaluation form focuses on the quantity of publications rather than the quality. Therefore, given that research is a pivotal element for promotion, the Panel recommends that the College should develop a research plan that is aligned with the college strategic goals, mission, and vision; devise a clear procedure to ensure that quality scientific research is carried out by faculty members; and set a plan to encourage faculty to apply for promotion.
- There are 18 full-time faculty employed in the Department of Chemical Engineering. One lecturer, five Assistant Professors and 12 Associate Professors, in addition to nine part-timers. Among these faculty members, 11 are dedicated to the Chemical Engineering programme, three are solely dedicated to PICENG programme and 10 serve for both programmes. As was evident from interviews and the provided curriculum vitae, faculty members cover appropriate range of academic credentials, specializations, and professional experience.
- As per the SER, students to faculty ratio in the academic year 2020-2021 was 38:1 with part timers, and 58:1 without part timers, which is considered high and was identified as the

most pressing risk during the interviews. During the virtual visit, the Panel noticed a clear effort to recruit faculty, but the funding constraints and hiring restrictions were the main impediments. Overall, the Panel supports the department plan for recruiting new faculty members with the outmost urgency and recommends that UoB should urgently expedite the implementation of its plan to recruit faculty members for the Department of Chemical Engineering.

- There are suitable processes for recognising and supporting all faculty's ongoing professional development. The provided evidence contains several requests for identifying faculty development needs at the college and university levels. A good number of workshops, training and development opportunities have been organised over the last four years. Activities of orientation and induction of new faculty and part timers are also reported. During the interviews, the Panel learned that support to attend conferences and workshops is available, as well as research funds based on research proposals.
- The SER does not refer to any measures in place to monitor staff turnover and ensure the retention of highly qualified academic staff. The provided evidence includes the College statistics over the last five years, not the Department. However, during the virtual visit, the Panel found that one faculty member had retired in the past five years. Nonetheless, the Panel recommends that the College should monitor the staff turnover and ensure the retention of highly qualified academic staff members.

Indicator 2.3: Physical and Material Resources

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

Judgement: *Partially Addressed*

- The SER and the supporting evidence describe and detail the several facilities of the programme including, classrooms, meeting rooms, computer laboratories and offices for academic and non-academic staff, which are equipped with computers, projectors, and interactive whiteboards with direct Internet connectivity, as noticed during the on-site campus tour. During the interviews with stakeholders, the Panel observed a reoccurring issue regarding malfunctioning or outdated equipment, in addition, the interviewees referred to the practical work as a concern, due to the quantity and state of repair of some equipment, which is substandard, besides, students are often loaded up on one single workstation. The Panel, therefore, recommends that the University should develop and expedite the implementation of a plan for the acquisition of sufficient modernised equipment.

- In addition to the Central Library at the UoB Sakhir campus, there is an Engineering Library located in the Isa Town campus, where the PICENG programme is offered. Access is provided to these libraries and the digital library catalogue and portal, which is accessible within the library or remotely. The Panel appreciates that the Engineering Library is well-equipped with e-books and electronic journals which support the teaching, learning and research needs of the PICENG faculty and students.
- With regard to the maintenance of the resources, evidence was provided on outfitting the computer laboratories with the course's required software, which are regularly updated. During the on-site campus tour, the Panel noticed that the Air Condition system is not working in certain buildings, and due to this problem, the chemicals had been safely moved to other places. The Panel observed, also, during the tour visit, that certain buildings were not well-maintained, and toilets are not equipped for students with special needs. Therefore, the Panel recommends that the University should expedite the implementation of a plan for addressing building maintenance, particularly of the Air Condition system, and provide suitable toilets for students with special needs.
- The health and safety of students and faculty on campus is ensured by health and safety measures. The Facilities and Occupational Health and Safety Committee looks over the health and safety of students and staff. During the on-site campus tour, the health and safety signs and instructions were well displayed and clear. The Panel is of the opinion that these policies and measures are appropriate and adequate.

Indicator 2.4: Management Information Systems

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

Judgement: Addressed

- UoB has an effective Student Information System (SIS), which is used to record and manage information regarding students' admission, registration and progression, as well as course evaluations, approval of grades, grade appeals and academic advising. The SIS generated reports are used by academic and administrative staff for academic planning and decision-making purposes. In addition, students and staff have also access to a learning management system, Blackboard, where all the courses material are posted. However, the Panel was not provided with evidence to support that laboratories utilization, e-learning and e-resources are tracked and used to take informed decisions. Thus, the Panel recommends that the College should ensure that generated reports of the utilisation of laboratories, e-learning and e-resources are used to inform decision making.

- There are policies and procedures in place to ensure the security of learners' records and accuracy of results. Students' records are kept with the Deanship of Admission and Registration, and no modification is permitted outside the formal procedure. Moreover, students data is stored safely in the Information Technology Center, which houses electronically archived documents. During the virtual site visit, the Panel was informed that the awarded certificates and transcripts are accurate and issued in a timely manner, usually 1-2 days.

Indicator 2.5: Student Support

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

Judgement: Addressed

- During the interviews with faculty, the Panel learned that the College doesn't have enough number of technicians to support laboratory work due to budget limitations and it was clear to the Panel that the College is aware of this lack. The Panel was informed during interviews and the tour visit that a laboratory technician had been laid off due to budgetary restriction and that the whole College has only 10 technicians and four demonstrators, who cannot sufficiently fulfil the needs of all programmes and students of the College. This is in addition to the lack of administrative staff to serve the Department. Therefore, the Panel recommends that the College should urgently develop and implement a plan to recruit more laboratory technicians and staff to assist with the administrative work at the Department and provide students with the needed support.
- The Students Rights Regulations define a student rights charter and describe the university's available facilities, resources, guidance, and care. At the beginning of each academic year, newly admitted students are provided with two induction days that are organized by the Deanship of Students Affairs at the institutional level and the College of Engineering. The SER did not provide information about career guidance services; however, the Panel was informed during the interviews that the departmental Industrial Training Coordinator, who is also a member of the College of Engineering Industrial Training Committee, prepares students and counsels them on different matters, such as career opportunities, job searching, ethical responsibility, and success strategies.
- As per the evidence provided, each student is assigned an academic advisor to monitor his/her academic progress and achievements. Students with special needs are also supported through their academic advisors in conjunction with the Guidance and Counseling Department of the Deanship of Students Affairs. The advisor has access to all pertinent information, such as registered courses, transcript, and grade point average.

Students are considered 'at risk' if their CGPA is below 2.30. In such cases, students are required to meet more often with their academic advisors who follow-up their progress with the course instructors. According to the Annual SER, in the fall semester of 2021-2022, around 46 students (12.5%) were at risk (under probation). However, during the virtual interviews, the Panel noticed that some students rarely meet or interact with their academic advisor. The Panel advises the College to encourage academic advisors to engage with students at least once per semester.

- Surveys are used to assess students' satisfaction with the provided support services. The results of these surveys show that students are generally satisfied and are benefiting from the different support services provided by the College and the University.

Standard 3

Academic Standards of Students and Graduates

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

Indicator 3.1: Efficiency of the Assessment

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

Judgement: Addressed

- Assessment methods, as described in the course specification, are suitable to evaluate the theoretical and practical courses and escalate in complexity in higher-level courses. These include quizzes, tests, activities, presentations, reports, and examinations. The Panel is of the view that the nature of the assessments employed meets the sector standard. In addition, the Panel was provided with sufficient evidence to demonstrate that the assessments are mapped and aligned to the PILOs, UILOs, and SOs.
- The Panel notes that there are appropriate mechanisms in place to evaluate the achievement of the PILOs and the SOs through the assessment of the CILOs and the surveys. The Panel is satisfied with the mechanisms used to monitor and improve assessments. These mechanisms include the internal and external moderation processes, quality audits conducted by the Quality Committee at the college level and the annual self-evaluations conducted at the department level.

Indicator 3.2: Academic Integrity

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

Judgement: Addressed

- There is a clear Anti-Plagiarism Policy which specifies the definition of misconduct, penalties, and procedures for both detection and disciplinary actions. In addition, the Student Misconduct Bylaws provide further detail for the disciplinary actions and student appeal process. Students are introduced to these policies and regulations during their

induction at the university and the college levels and in the introductory session of each course.

- Evidence of active monitoring of academic integrity was provided. Students are required to submit their work through the Turnitin plagiarism detection software. Examinations are invigilated, and a reporting mechanism is in place for suspected misconduct. Evidence was also provided for misconduct cases and these were resolved in line with the policies.

Indicator 3.3: Internal and External Moderation of Assessment

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

Judgement: *Partially Addressed*

- The Moderation of Assessment Regulations and the Study and Examination Regulations depict the process of moderation, which includes internal pre-assessment moderation, internal post-assessment moderation and external-post assessment moderation. The Panel notes, however, that the moderation policies and regulations do not include detailed procedures related to the appointment and approval of external moderators. Therefore, the Panel recommends that UoB should revise the policies and regulations related to external moderation to include clear criteria for the appointment and approval of external moderators.
- Discussions with faculty and senior management indicated that moderation and review of courses is taking place on a very ad-hoc basis and is not happening for all courses within the programme. Internal moderation forms for a number of courses demonstrate that internal moderators conduct a review of the marking guide and model answer for each assessment, and a sample of assessed work. The Panel examined the submitted internal moderation form samples and noticed that this is mostly a tick-box exercise with no actual feedback comments provided for the review. An example of an external moderation form for a single course was provided, which requires the external moderator to review a specific course only. The review encompasses the course materials, examination, examination model answers, and a sample of assessed work. Again, this was mostly a tick-box exercise, although there was minor feedback text available. Therefore, the Panel recommends that the College should ensure that internal and external moderations are done for all course assessments and encourage both the internal and external moderators to add their written feedback on the moderation forms.
- As per the SER, the findings of internal and external moderators are communicated to the course coordinators, which in turn communicate these findings to the Moderation Committee and subsequently to the Quality Assurance Committee (QAC) at the

department level, which monitors the moderation process to ensure its effectiveness and the continuous improvement of the PICENG programme and its courses.

Indicator 3.4: Work-based Learning

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

Judgement: Addressed

- Work-based learning is covered in the 'Industrial Training' (PICENG390) course and carries a pre-requisite completion of 85 credits. The course has clear CILOs, which effectively contribute to the achievement of the PILOs. As indicated in the course syllabi, all students are required to complete 300 hours of supervised training in an approved training place. Students can also be exempt from the industrial training if they have equivalent industrial experience. The Internship Training Guidelines clearly detail the policies related to the industrial experience including roles and responsibilities of relevant parties. However, the guidelines state that an internship should last a minimum of eight weeks (i.e., 35 hours per week). This is a total of 280 hours and not the 300 hours specified in the course syllabi document. The Panel suggests that the Internship Training Guidelines and course syllabi are reviewed to ensure consistency.
- The Panel notes that assessment methods of the Industrial Training course are appropriate and include reports and presentations that are assessed by the course supervisors. The Panel confirmed during the interviews that the students and internship supervisors evaluate the internship course through surveys to improve the work placements experience.
- Interviews with external stakeholders including alumni and internship providers indicate that there is suitable availability of placements; roles and responsibilities are clear; feedback and assessment are collected; and that overall, the experience is highly rewarding. In many cases, the industrial placement leads to direct employment. Therefore, the Panel appreciates the interaction between faculty, alumni, and local industry, which leads to students' employment after their graduation.

Indicator 3.5: Capstone Project or Thesis/Dissertation Component

Where there is a capstone project or thesis/dissertation component, there are clear policies and procedures for supervision and evaluation which state the responsibilities and duties of both the supervisor and students, and there is a mechanism to monitor the related implementations and improvements.

Judgement: *Partially Addressed*

- Discussions with faculty indicated that the capstone projects are divided into two courses, a 'Process Control Design Project' (PICENG 422) course and a 'Senior Project' (PICENG 490) course. The Panel is of the view that both courses do not sufficiently meet the requirement for a capstone design project. A design project would typically contain detailed hand calculations to confirm the computer simulation data, a mechanical or physical design, a risk assessment (including HAZOP), an environmental impact assessment, and a more rigorous estimation of the plant economics. Internationally, there is no direct comparison to these two courses, as many institutions favour the 'design project'. Therefore, the Panel recommends that the College should review the two courses of the capstone projects with the aim of merging them to produce a formal design project course that covers technical, economic, and environmental requirements in-line with international standards.
- The responsibilities of students and supervisors are clearly defined in the SER [p.73]. As per the SER, students are well-informed of the procedures and the criteria for submitting their projects during the course lectures. Though, the Panel advises the College to include all the regulations and procedures related to the capstone projects in one document and to ensure that it is accessible to students and supervisors in printed form and on its website.
- Although, 'Process Control Design Project' (PICENG 422) course and 'Senior Project' (PICENG 490) course are mapped to SO2 and SO4 and their reports show a good level of technical design; the achievement of SO2 and SO4 is not well-demonstrated. A sample of four reports of the 'Process Control Design Project' (PICENG 422) course was provided. One report contains a reasonable section on safety and the other reports are generally weak in this area. None provide HAZOP analysis. No reports for 'Senior Project' (PICENG 490) course were available. In general, the provided course reports are lacking significant components related to public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors. Based on the evidence provided there is not enough rigour in the reports to demonstrate the achievement of SO2 and SO4. Therefore, the Panel recommends that the College should ensure that the work required from students in the capstone projects is reviewed and coordinated to ensure that Student Outcomes (SO2 'an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors' and SO4 'an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts') are being emphasised.

- Based on the SER, the capstone project is evaluated by the project supervisor (50%), two internal examiners (40%) and one external examiner (10%). Students are also required to submit a poster and a presentation as part of their viva-defense. In addition, there is a dedicated committee to oversee the implementation of the regulations and procedures related to these projects.
- The Panel notes that the progress of the students in their projects is regularly monitored by their supervisors. During the interviews, students confirmed that their progress is regularly monitored, and feedback and guidance are given to them throughout the duration of the projects.

Indicator 3.6: Achievements of the Graduates

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

Judgement: *Partially Addressed*

- Several examples of students' assessed work from different course levels were provided, which demonstrates that the grading is consistent with the quality of work submitted; and indicating that the achievements of students are, in general, appropriate. However, the Panel was not satisfied with the quality of some of the capstone projects which were below the standard that would be expected.
- Students' intake into the PICENG programme has decreased over the last four academic years, while the total number of students in the programme has been continuously on the increase. The statistics presented in the evidence, show that the average time to complete the programme is around 5.5 years with a maximum of seven years and a minimum of around 4.5 years and the total number of registered students is going up. In addition, according to the Annual SER, in the fall semester of 2021-2022, 12 students (around 3.3% of students) are either dismissed or canceled their admission. The Panel discussed these findings with the senior management and faculty members during the interviews and found that there is a plan to introduce a diploma degree as an exit strategy for low-performing PICENG students. The Panel recommends that the College should monitor the student failure rate and the number of students withdraw or exit with the new Diploma qualification with the aim to understand the root cause of the lower student outcome.
- Tracking information for graduates is available from 2007 to present. It indicates that the post-graduation destination for many students is into various academic, industrial, and business roles, from progression to advanced degrees; engineering positions in various companies; and positions in other business sectors. The 'Alumni and Employer Survey

Report of 2021-2022' indicates that the employment percentage varied between 80% to 100% over the last three years. The report indicates that employers are generally satisfied with the programme graduates.

Standard 4

Effectiveness of Quality Management and Assurance

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

Indicator 4.1: Quality Assurance Management

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

Judgement: Addressed

- Quality Assurance (QA) of the PICENG programme adheres to the guidelines, procedures and regulations defined in the UoB Quality Manual, which guides the Dean, Head of Department (HoD) and faculty members. In addition, the Programme Quality Assurance and Enhancement Policy supports the university's education strategy where the main purpose is to assure and enhance programme evaluation procedures. The Panel notes that these policies and regulations are recent and regularly updated as evidenced by the version number and dates stated on the provided documents. During the interviews, the Panel confirmed that QA policies and procedures are well-communicated to all stakeholders including UoB administration, faculty members, the SAC and the PAC.
- As described in the Quality Manual, QA practices are governed by the Quality Assurance and Accreditation Center (QAAC), which coordinates and supports quality assessment efforts across all UoB's colleges through the Quality Assurance Executive Committee (QAEC). At the College level, the College Quality Assurance Office Director, who is a member of the QAEC, is in charge of implementing the QA system across all programmes. The Director regularly meets with the coordinators of the department QAC to ensure that QA standards are consistently met across all programmes.
- During the virtual interviews, faculty members and staff demonstrated a high level of QA awareness and execution. In addition, the Panel was informed that QA awareness sessions, QA YouTube videos, and compulsory inductions are provided to all faculty members. The Panel appreciates the faculty commitment and determination in ensuring the highest standards in QA practices.
- The Panel acknowledges through evidence provided and interviews with faculty, SAC and PAC members that stakeholder's feedback is effectively used to implement QA

progressive change to attain the highest standards of academic practice despite budgetary limitations.

Indicator 4.2: Programme Management and Leadership

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

Judgement: Addressed

- The PICENG programme QA is managed by a well-structured organisational hierarchy which provide efficient communication and decision support. The programme is housed in the Department of Chemical Engineering. The Department Council, which is chaired by the HoD, receives decision support from 16 departmental committees, and oversees matters related to teaching, research, and examination, as well as scientific, cultural and sports affairs within the Department. At the college level, the College Council sets the strategic directions of the programme, provides the necessary support, and monitors its progression.
- The department committees are established at the beginning of each academic year with clear terms of reference. Committee chairs report to the HoD and to the Department Council, as shown in the minutes of meetings, to further discuss and approve academic decisions. The HoD reports to the Dean. The Panel confirms that the existing reporting lines are clear and effective.
- The key academic posts related to QA of academic programmes are the Vice President for Academic Programmes and Graduate studies, President Advisor for Academic Quality, College Deans, HoDs, Programme Coordinators, and the Faculty Members. Their duties and responsibilities are outlined in the Quality Manual. Similarly, the department committees terms of reference provide the description, membership, roles, and responsibilities of these committees.
- The Department Council is responsible for approving all academic decisions made by the department's Academic Committee, including curriculum changes and introduction of new tracks and programmes. Then, the decisions are raised to the College Council, then forwarded to the Academic Committee at the university level and then to the University Council. The Panel is satisfied with the different levels of the academic responsibility and the custodianship of the academic standards of the programme. Based on the evidence provided and interviews, the Panel concludes that the current management structure of the programme is effective with a strong organisational leadership.

Indicator 4.3: Annual and Periodic Review of the Programme

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

Judgement: Addressed

- As per the SER, the PICENG programme undergoes a thorough annual and periodic evaluation processes, in accordance with the Quality Assurance and Enhancement Policy, the Quality Manual, and the Operational Plan. The annual evaluation process includes inputs from different sources (i.e., admissions, assessment of PILOs, surveys, etc.), and results in an Annual SER, which is approved and endorsed by the Department Council. The Annual SER includes recommendations and improvement plan with clear allocated responsibilities and timeline. The Panel appreciates the sound process for the annual evaluation of the programme.
- As per the SER, periodic review of the programme has been conducted in 2008, 2014 and 2020 to ensure that the programme meets ABET accreditation requirements, in addition to a periodic review in 2019 to place the programme on the NQF. Furthermore, the SER, clarifies that the study plan was recently reviewed based on the benchmarking study conducted by the Department, the annual self-evaluation of the programme and the feedback received from the PAC and the SAC. The Panel learned during interviews that as a result of the periodic review, the programme name will be changed to Instrumentation and Control Engineering (ICENG). The amendments were commended by SAC and PAC members during the interviews. The College Council, QAAC, QAC, and the Department Council are responsible for monitoring the implementation of the periodic review recommendations.

Indicator 4.4: Benchmarking and Surveys

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

Judgement: Addressed

- UoB has a Benchmarking Policy, which was developed to ensure comparability of its programmes with similar local, regional, and international programmes. A benchmarking study was recently conducted for the PICENG programme in 2021-2022 with one regional programme and seven international programmes. The overall results of the benchmarking report have been considered for improving the programme by the department's Academic

Committee. The Panel concludes that the benchmarking study has been effectively utilised to improve the programme.

- The Department conducts regular meetings with PAC and SAC and uses several periodic surveys to collect the feedback of internal and external stakeholders. During the virtual interviews, the Panel was able to confirm the existence of a strong cooperation between the Department and its stakeholders including SAC and PAC. Evidence was provided to demonstrate that feedback and recommendations made by stakeholders are acted upon. For example, a recent curriculum change plan is discussed and approved by all stakeholders and is currently under action. Evidence was also provided on annual feedback and recommendations on issues related to student advising, faculty load and curriculum changes to meet market and industry needs. However, the Panel is concerned with the low response rate of the Alumni Surveys, where out of 27 students who graduated in 2021-2022, only six responded to the survey. Therefore, the Panel suggests that the College develops and implements a mechanism to increase the response rate of different surveys.

Indicator 4.5: Relevance to Labour market and Societal Needs

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

Judgement: Addressed

- The PICENG programme has a functioning PAC with clear roles and responsibilities that are defined in its terms of reference. The PAC includes industry representatives, employers, and alumni. As per the SER, the PAC meets at least once a year. As mentioned earlier in this Report, the feedback and suggestions of the PAC members are compiled and reported in the Annual SERs and action plans are set based on their feedback and suggestions with clear responsibilities and timeframe. The PAC members confirmed to the Panel during the virtual interviews that results from the QAC and Annual SERs are discussed and shared with all stakeholders and commended the recent curriculum changes that will align the new PICENG programme, aka (ICENG), with recent advancement in technology.
- Based on the evidence provided and interviews, the Panel learned that the Department relies on feedback from both the PAC and SAC and the different survey analysis to ensure that the programme is aligned with the labour market needs and the latest technology developments (Industry 4.0, Machine Learning, Cyber Security etc.). The Panel also notes that a market survey was recently conducted, however, the Panel recommends that the College should conduct more detailed market analysis on a regular basis using other tools

in addition to surveys such as interviews and published statistics to ensure that the PICENG programme meets the labour market needs.

V. Conclusion

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

There is Confidence in the B.Sc. in Process Instrumentation and Control Engineering of College of Engineering offered by the University of Bahrain.

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

1. The variety of life-long learning activities provided to students.
2. The Engineering Library is well-equipped with e-books and electronic journals which support the teaching, learning and research needs of the faculty and students.
3. The interaction between faculty, alumni, and local industry, which leads to students' employment after their graduation.
4. The faculty commitment and determination in ensuring the highest standards in quality assurance practices.
5. The sound process for the annual evaluation of the programme.

In terms of improvement, the Panel recommends that the UoB should:

1. Introduce a risk register, which includes the risks related to the quality of the programme, its delivery and academic standards, and ensure that such a register is regularly updated, and the identified risks are effectively dealt with.
2. Add the 'Process Safety' (CHENG465) course to the compulsory courses and ensure that all students are introduced to safety engineering, including Hazard and Operability Analysis (HAZOP).
3. Review the delivery of English communication skills of students, and their leadership and managerial skills throughout the programme with the aim of improving these soft skills, in addition to increasing student's access to practical sessions to further enhance their practical skills.
4. Review the course syllabi and update the textbook and reference sections with recent book editions.

5. Develop a research plan that is aligned with the college strategic goals, mission, and vision; devise a clear procedure to ensure that quality scientific research is carried out by faculty members; and set a plan to encourage faculty to apply for promotion.
6. Urgently expedite the implementation of the Departments' plan to recruit faculty members at the Department of Chemical Engineering.
7. Monitor the staff turnover and ensure the retention of highly qualified academic staff members.
8. Develop and expedite the implementation of a plan for the acquisition of sufficient modernized equipment.
9. Expedite the implementation of a plan for addressing building maintenance, particularly of the Air Condition system, and provide more suitable toilets for the special needs.
10. Ensure that generated reports of the utilization of laboratories, e-learning and e-resources are used to inform decision making.
11. Urgently develop and implement a plan to recruit more laboratory technicians and staff to assist with the administrative work at the Department and provide students with the needed support.
12. Revise the policies and regulations related to external moderation to include clear criteria for the appointment and approval of external moderators.
13. Ensure that internal and external moderations are done for all course assessments and encourage both the internal and external moderators to add their written feedback on the moderation forms.
14. Review the two courses of the capstone projects with the aim of merging them to produce a formal design project course that covers technical, economic, and environmental requirements in-line with international standards.
15. Ensure that the work required from students in the capstone projects is reviewed and coordinated to ensure that Student Outcomes (SO2 'an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors' and SO4 'an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts') are being emphasised.

16. Monitor the student failure rate and the number of students withdraw or exit with the new Diploma qualification with the aim to understand the root cause of the lower student outcome.
17. Conduct more detailed market analysis on a regular basis using other tools in addition to surveys such as interviews and published statistics to ensure that the PICENG programme meets the labour market needs.