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

Directorate of Higher Education Reviews

Programme Review Report

University of Bahrain
College of Science
Bachelor of Science in Mathematics
Kingdom of Bahrain

Site Visit Date: 17-19 October 2022

HA063-C3-R063

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Acronyms

ASER	Annual Self Evaluation Report
ASIIN	Accreditation Agency for Study Programmes in Engineering, Informatics, Natural Sciences and Mathematics
APR	Academic Programme Review
BQA	Education & Training Quality Authority
B.Sc.	Bachelor of Science
CILO	Course Intended Learning Outcome
DHR	Directorate of Higher Education Reviews
HEC	Higher Education Council
HoD	Head of Department
HEI	Higher Education Institutions
IT	Information Technology
NQF	National Qualifications Framework
PAC	Programme Advisory Committee
PEO	Programme Educational Objectives
PILO	Programme Intended Learning Outcome
QAAC	Quality Assurance and Accreditation Centre
QAAEC	Quality Assurance and Accreditation Executive Committee
QAC	Quality Assurance Committee
QAMS	Quality Assurance Management System
QAO	Quality Assurance Office
SAC	Student Advisory Committee
SER	Self-Evaluation Report
SIS	Student Information System
UILO	University Intended Learning Outcome
UoB	University of Bahrain

I. Introduction

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

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

The Cycle 2 APR Review Framework is based on four main Standards and 21 Indicators, which forms the basis 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 judgments on the indicators, the Panel additionally determines whether each of the four standards is 'Satisfied' or 'Not Satisfied', thus leading to the Programme's overall judgment, as shown in Table 1 below.

Table 1: Criteria for Judgements

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

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

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

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

II. The Programme's Profile

Institution Name*	University of Bahrain
College/ Department*	College of Science Department of Mathematics
Programme/ Qualification Title*	Bachelor of Science in Mathematics (B.Sc. in Mathematics)
Qualification Approval Number	University Council Decision no. (323/1998) dated June 1998
NQF Level	8
Validity Period on NQF	5 years from Validation Date
Number of Units*	41
NQF Credit	507
Programme Aims*	The graduates of the BSc. in Mathematics are expected to: 1. Work successfully in a career related to mathematics. 2. Pursue a graduate programme in mathematics or a related field.
Programme Intended Learning Outcomes*	Upon completion of the BSc. in Mathematics programme, graduates will be able to: a) Demonstrate knowledge of core areas of mathematics, statistics, and basic sciences. b) Use logical reasoning, formal proof, generalization, and abstraction. c) Apply mathematics to real life problems by formulating and solving them and interpreting their solutions. d) Employ different mathematical concepts in solving a wide range of problems within mathematics. e) Identify the relationship between mathematics and other disciplines. f) Communicate effectively within practice. g) Integrate technology in solving and understanding mathematical and scientific problems. h) Integrate ethics, responsibility, legal and social issues within professional practice. i) Perform basic scientific research. j) Engage mathematical lifelong learning through continuous professional development.

* Mandatory fields

III. Judgment Summary

The Programme's Judgment: Confidence

Standard/ Indicator	Title	Judgement
Standard 1	**The Learning Programme**	**Satisfied**
Indicator 1.1	The Academic Planning Framework	Partially Addressed
Indicator 1.2	Graduate Attributes & Intended Learning Outcomes	Partially Addressed
Indicator 1.3	The Curriculum Content	Addressed
Indicator 1.4	Teaching and Learning	Addressed
Indicator 1.5	Assessment Arrangements	Addressed
Standard 2	**Efficiency of the Programme**	**Satisfied**
Indicator 2.1	Admitted Students	Partially Addressed
Indicator 2.2	Academic Staff	Addressed
Indicator 2.3	Physical and Material Resources	Addressed
Indicator 2.4	Management Information Systems	Addressed
Indicator 2.5	Student Support	Addressed
Standard 3	**Academic Standards of Students and Graduates**	**Satisfied**
Indicator 3.1	Efficiency of the Assessment	Addressed
Indicator 3.2	Academic Integrity	Partially 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	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	Partially Addressed
Indicator 4.5	Relevance to Labour Market and Societal Needs	Addressed

IV. Standards and Indicators

Standard 1

The Learning Programme

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

Indicator 1.1: The Academic Planning Framework

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

Judgment: ***Partially Addressed***

- There is a clear planning process to ensure that the Bachelor of Science (B.Sc.) in Mathematics programme is relevant, fit for purpose, and complies with existing regulations. The process follows the University of Bahrain (UoB) document entitled 'Regulations for Offering and Developing Academic Programmes and Courses' and a number of other supporting documents such as the Programme Quality Assurance and Enhancement Policy and the Quality Manual. Moreover, the departmental Quality Assurance Committee (QAC) is responsible for the implementation of the university's policies, plans, regulations and procedures.

- The Panel notes that, utilizing the Academic Risk Management Guide and the Academic Program Risk Register Template, several potential risks for the programme have been identified. The impacts of the identified risks are assessed and some actions to mitigate them have been defined. However, there is no evidence that ensures the implementation of the proposed mitigation plans in order to monitor the identified risks since no achievement progress is reported in the risk register document. Moreover, the Panel notes that there are other risks such as low enrollment of students, which are included in the Annual Self Evaluation Reports (ASERs), but not included in the risk register file. Thus, the Panel recommends that the College should ensure that the potential risks, especially those related to the quality of the programme, its delivery and academic standards are regularly and correctly identified, completely documented, and effectively dealt with.

- According to the Validation Report prepared by the General Directorate of National Qualifications Framework & National Examinations in May 2021, the B.Sc. in Mathematics programme offered by UoB sufficiently satisfies the National Qualifications Framework (NQF) requirements and is placed on NQF Level 8, where the validity of its placement is for a total of five years starting from the date of placement on the NQF register. By being

placed on the NQF Register, the programme adheres to the NQF's qualification design requirements as well as the related mapping and confirmation processes.

- The programme's title 'B.Sc. in Mathematics' is concise, and indicative of the qualification's type and content and it is found to be accurately documented on issued certificates, the university's website, programme description documents and other programme publications.

- The programme has clear and appropriate aims that are reflected by two programme educational objectives (PEOs). The PEOs are clearly aligned with the college and institution missions and strategic goals, as illustrated by the mapping between PEOs and the major components of the university and college missions and the University's Strategic pillars. Moreover, the PEOs have been recently revised to include a third objective related to enhancing society's development. However, the Panel notes that none of the PEOs is mapped to the university strategic pillar 2 'Leading Edge Human Capital'.

- Overall, the Panel finds that the Programme has a clear academic planning framework, reflected in clear aims which are aligned with the mission and strategic goals of the Institution and the College. Moreover, the Panel recommends that the College should ensure that the Department of Mathematics develops and implements a comprehensive operational plan to achieve its mission as well as the strategic goals of the College and the University.

Indicator 1.2: Graduate Attributes & Intended Learning Outcomes

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

Judgment: *Partially Addressed*

- There are six University Intended Learning Outcomes (UILOs) representing generic graduate attributes, which are embedded within the programme in terms of 10 Programme Intended Learning Outcomes (PILOs) as described by the mapping of PILOs to UILOs. However, the Panel notes that UILO (6) is not covered by any PILO due to inaccurate mapping since UILO (6) is clearly related to PILO (j). Moreover, there is also a clear relation between PILOs (h, i) and UILOs (5, 6), respectively.

- The PILOs are clearly stated and found to be appropriate for the type and level of the programme. The PILOs are linked to the PEOs through PILO-PEO mapping. They are appropriately written in a measurable format and evidence for measuring the achievements of the PILOs has been presented. The results of the assessment of the PILOs for each academic year are reported in the ASER.

- The PILOs meet the complexity level of NQF Level 8, since the programme satisfies the requirements of the NQF, as mentioned earlier. Moreover, the Panel notes that the PILOs

have been benchmarked with other international programmes in five universities world-wide. However, the Panel notes that the PILOs do not incorporate any teamwork skills and it is not clear how the PILO (e) is defined, assessed and measured. Moreover, the Panel also notes that there is inconsistent mapping of the PILOs to the Outcome Domains they belong to.

- The Panel notes that all programme courses use a unified course syllabus form. The syllabus for each course includes a set of Course Intended Learning Outcomes (CILOs) which are clearly stated, measurable and appropriate for the contents and the level of the course. It also includes the relevant NQF level for the course which is obtained by mapping the CILOs to the relevant NQF level descriptors. This mapping ensures the appropriateness of the CILOs. The appropriateness of the CILOs of each course is also ensured through an internal process which requires the discussion and the approval of the CILOs by the QAC and the Department Council. This was also confirmed during the interviews. On the other hand, the Panel notes that the course syllabi of MATHS 253, 307 and 311 are written by fault as MATHS 203 course syllabus, which need to be fixed.

- Each course syllabus includes the mapping of CILOs to PILOs. A detailed mapping of programme courses to the achieved PILOs is presented as well. However, the Panel notes that some CILO-PILO mappings are questionable. For example, in MATHS 121, it is not convincing to map CILO (6) to PILO (a). This has been fixed in the CILO-PILO mapping in the updated course MATHS 131. Unfortunately, the Panel notes that there is inconsistency between the CILO-PILO mapping in the course syllabus of MATHS 131 and the new programme specification form. Moreover, when offered in the first semester of the academic year 2021-2022, the course syllabus of MATHS 121 shows different CILO-PILO mappings including mapping to PILO (i).

- Overall, the Panel finds that the PILOs and CILOs are appropriate for the level of the degree and meet the NQF requirements. However, the Panel recommends that the College should incorporate teamwork and leadership-based skills in PILOs and CILOs and revise the mapping of CILOs to PILOs and the mapping of PILOs to UILOs and PEOs to ensure full coverage of the university graduate attributes and programme objectives.

Indicator 1.3: The Curriculum Content

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

Judgment: ***Addressed***

- The Panel notes that both the 2017 and the recently approved 2021 study plans are organized in such a way that students are expected to graduate in eight semesters (four years) after passing the total required credit hours of 127 (507 NQF credits) with a reasonable semester load ranging from 14 to 17 credit hours. The Panel confirms that the

courses are distributed over the study plan based on the course level starting with basic math and science courses to high level math courses and keeping in mind the required pre-requisites, allowing students to gradually build up the required knowledge and skills and hence achieving appropriate course-by-course and year-on-year progression.

- According to the evidence provided, the Panel acknowledges that the math curriculum has gone through a number of revisions in light of feedback from stakeholders, benchmarking, quality assurance and accreditation requirements. The last major and comprehensive revision of the curriculum was initiated in 2018 and approved recently in 2021. This revision took into account the results of benchmarking the math curriculum with a number of universities worldwide, the accreditation requirements and recommendations of the BQA and the Accreditation Agency for Study Programmes in Engineering, Informatics, Natural Sciences and Mathematics (ASIIN), and feedback from stakeholders and advisory committees. The Panel acknowledges that this revision resulted in a number of important and crucial updates in the math curriculum. The amount of work done in this comprehensive revision is highly valued, which has indeed enriched the math curriculum and resulted not only in meeting the ASIIN accreditation requirements, but in an undergraduate math curriculum of high standard. Moreover, the Panel affirms that this revision ensured that the course contents cover all elements expected in term of depth and breadth. Overall, the Panel appreciates that the periodic review of the programme has resulted in a new curriculum that is well-structured and meets the requirements of the NQF and international norms reflected in ASIIN accreditation.

- The Panel recognizes that there are several mechanisms in place to ensure an appropriate balance between theory and practice and between knowledge and skills or at least to provide some feedback that the Department of Mathematics can use and act accordingly. These mechanisms include benchmarking, senior student exit survey, alumni survey, employer survey and feedback from the Student Advisory Committee (SAC) and the Programme Advisory Committee (PAC)

- The Panel notes that the used textbooks and references, in general, are appropriate with a combination of current and standard textbooks. Online resources are utilized in some courses. The Panel also notes that determining the appropriateness of textbooks for some specialized topics requires seeking the opinions of experts from that specific field which is being taken care of by the Textbook and Library Committee. However, the Panel didn't find any evidence for the use of recent research findings and current professional practice in course materials and teaching and learning activities. Thus, the Panel recommends that the College should ensure effective utilization of recent research findings and current professional practice in enhancing the course materials and teaching and learning activities.

Indicator 1.4: Teaching and Learning

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

Judgment: ***Addressed***

- There is a university policy entitled 'Teaching and Learning Policy'. The policy has five principles, two of them related to the learning environment and teaching methods that are appropriate for the discipline and inclusive of all students. The Panel notes that the unified course syllabus for math courses specifies the used teaching methods in each course, which are in line with the University Teaching and Learning Policy and enable the attainment of the intended learning outcomes. These teaching methods include lectures, tutorials, discussions, problem solving, projects and computer-based exercises as well as online learning. However, the Panel notes that the course MATHS 304 does not specify the teaching methods used.

- The Panel learned during the virtual site visit interviews that e-learning is facilitated through the Blackboard platform which allows instructors to post different online resources to enhance student learning. During the virtual site visit, a session was dedicated for illustration of courses utilizing Blackboard. Also, during the interviews, it was confirmed that the e-learning experience has been enhanced since the Covid-19 pandemic.

- The Panel also notes that project-based learning and work-place learning have been added as requirement components in the updated math programme, which are likely to enhance the students' exposure to professional practice, and their independent and lifelong learning skills as well as their research skills and ability to create and innovate. The student senior exit surveys and interviews confirm that students believe in continuing professional development and aim to develop their skills and knowledge after graduation and that the projects within their academic programme prepared them well for their profession.

- The Department of Mathematics promotes other learning activities such as field trips and the celebration of the International Day of Mathematics, which show that the Department encourages different types of learning. Moreover, the student senior exit surveys show that more than 68% of the students agree that the extracurricular activities are enriching and support their learning experiences. Overall, the Panel appreciates that the methods used for teaching in the programme support the attainment of programme aims and intended learning outcomes.

Indicator 1.5: Assessment Arrangements

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

Judgment: ***Addressed***

- There is a university assessment framework which is stipulated in a number of documents, namely, Assuring Learning Guide, Teaching and Learning Policy, Study and Examination

Regulations and Moderation of Assessment Regulations. The Panel notes that examples of assessment methods are provided in these documents. Moreover, detailed regulations of the examination process are presented in the Study and Examination Regulations. The Panel learned that these policies and regulations are published on the university website. Moreover, in the unified course syllabus, students are referred to the university website for university regulations and rules, although English versions of these regulations were not always available. Hence, the Panel advises the University to make sure that all the related links provided are active, and the English versions are available.

- Although in the Self-Evaluation Report (SER), it is stated that formative and summative assessment methods are used, the assessment methods included in the course syllabi are mainly summative. The used assessment methods include quizzes, homework assignments, tests and projects with clear instructions, questions, mark distribution, marking scheme and marking criteria if applicable. During the interviews, the Panel was informed of the use of some formative assessment methods, which are limited to certain courses. The Panel recommends that the College should extend the use of formative assessment methods to other courses and incorporate them in the course syllabi.

- The Panel notes that each assessment type, its relation to the relevant CILOs, its weight and schedule are clearly written in the course syllabus, which is distributed to students at the beginning of the semester with 60% weight for in-term assessments and 40% for the final examination as per university regulations.

- As for feedback on students' assessed works/performance, there is a clear mechanism presented in the Study and Examination Regulations in which it is clearly stated that students should be given continuous feedback throughout the semester within a maximum of three weeks from the assessment activity. The evidence provided shows that instructors at the Department are following these regulations.

- For in-term assessments, the assessment solutions are provided to students, and they are given the chance to discuss their examination papers with course instructors, enquire about the marking scheme and ask for re-grading if they are not satisfied. There is also an appeal system in place against the final grade of the course. Provisions for the appeal are clearly stated in the Study and Examination Regulations.

- To ensure fairness and rigour of assessment, the Department implements moderation of assessment in line with the University Moderation of Assessment Regulations. This includes pre-moderation, post-moderation and external moderation using a corresponding form for each type of moderation based on a moderation rolling plan. Moreover, the Panel notes that to ensure fairness and consistency of assessment for multi-section courses, common tests/examinations are used across all sections and each question in the test/examination is marked by the same instructor across all sections and the same grading range is applied to all sections.

- The Panel acknowledges that provisions for addressing academic misconduct are stipulated in the Student Misconduct By-laws, Avoiding Plagiarism Policy and Study and

Examination Regulations with well-defined procedures, responsibilities, and disciplinary penalties. These university policies and regulations are implemented by the Department and a statement about academic honesty and plagiarism is also included in the course syllabi. Overall, the Panel acknowledges that suitable arrangements are in place, and are known to all relevant stakeholders, that help ensure transparency, accuracy, validity, reliability, fairness, and consistency of assessments of student achievements.

Standard 2

Efficiency of the Programme

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

Indicator 2.1: Admitted Students

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

Judgment: *Partially Addressed*

- The programme has clear admission requirements which are published in printed documents and online as well. The Panel notes that admission is mainly based on students' high school, English test and interview scores regardless of the student's gender. The Panel is of the view that the admission requirements are consistent with local and international academic standards and ensure the enrolment of students who are appropriate for the programme level. Moreover, as per the provided statistics, there is no evidence of unfairness, and the admission requirements are applied consistently. However, some of these requirements are not included in some of the published documents. For example, the requirement of the high school specialization in Science or Unified Tracks is not mentioned in the College Booklet. Thus, the Panel recommends that the College should ensure that the College Booklet and the university website contain the most updated admission criteria for the programme.

- There is an appropriate orientation programme, with clear exemption criteria, for inadequately prepared students to enter and progress in the programme. There are also clear regulations and procedures for access, progression, as well as internal and external transfer from and to the programme.

- Overall, the Panel acknowledges that there are clear admission requirements, which are appropriate for the level and type of the programme. However, the Panel was not provided with sufficient evidence to prove that the admission policy has been revised on a regular basis. The Panel recommends that the College should develop a mechanism for regular revision of the admission policy in light of student performance and feedback from relevant stakeholders, in addition to national and international benchmarks

Indicator 2.2: Academic Staff

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

Judgment: *Addressed*

- The University has clear published regulations and procedures for the recruitment, induction, appraisal, and promotion of academic staff which are consistently implemented in a transparent manner. The Panel notes that induction of new faculty is taking place at both the university and department levels. This was also confirmed during the interviews.

- There are clear policies and procedures to ensure the quality of scientific research carried out by faculty members. The overall implementation of these policies and procedures are supervised and managed by the Deanship of Graduate Studies and Scientific Research. The process of the approval of research funding requires ensuring the quality of scientific research carried out by faculty members and its alignment with the research plan of the College and the University. The Panel acknowledges the quality of scientific research carried out by faculty members, which is demonstrated by research publications in indexed journals with high SC Imago Journal Rank and impact factors. The Panel also appreciates the Department for its efforts in organizing an international conference on Emerging Trends in Pure and Applied Mathematics in 2021.

- In the SER, it is stated that the teaching load assigned to each faulty member is four sections (12 contact hours) per semester. However, the Panel notes that the teaching load of some faculty members is exceeding 10 courses during the whole academic year This issue of high teaching load was confirmed during the interviews and reported by the Department in the annual reports since the academic year 2018-2019. The Panel understands that the Department is heavily involved in teaching service courses, and it is in the process of hiring new faculty members. Excluding service courses, the Panel confirms that there are sufficient staff members with an appropriate range of academic qualifications, specializations and professional experience to teach on the programme. However, the Panel recommends that the College should speed up the process of hiring new faculty members to reduce the workload of faculty as well as the student-to-faculty ratio.

- The Panel notes that special needs of women are taken into consideration *via* the University Academic and Administrative Bylaws and the Regulation of Civil Service which are implemented consistently at UoB and are in line with international practices. By examining the provided evidence, the Panel notes that there are suitable and effective arrangements/policies/procedures for identifying and supporting continuing professional development needs of all staff, which are consistently monitored and evaluated.

- Monitoring and evaluation of in-house professional development activities were confirmed during interviews. The Panel appreciates the University for promoting continuous professional development through the Unit for Teaching Excellence and Leadership, E-learning Centre, and Quality Assurance and Accreditation Centre (QAAC), which encourages faculty members to obtain professional certificates such as the Postgraduate Certificate in Academic Practice. During the interviews, the Panel also learned that staff turnover is monitored, and the retention of highly qualified academic

staff members is ensured by the support provided by UoB to the faculty through the professional development arrangements, the appraisal system, and the research funds and incentives.

Indicator 2.3: Physical and Material Resources

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

Judgment: ***Addressed***

- Classes and laboratories are adequate in terms of number and size for the available students and are appropriately equipped. The Information Technology (IT) facilities are also adequate for students' needs. However, the Panel notes that there is no laboratory assistant in the Department and thus, the Panel recommends that the College should appoint a laboratory assistant for the department's computer laboratories to provide technical support to staff and students.

- The programme, together with other programmes at the College of Science, are supported by the Science & IT Library, which has adequate (hard and electronic) resources for the programme needs and encompasses appropriate formal and informal study places, photocopying and printing services, and public-access computers and Internet. All the above was confirmed through the Campus Tour. Overall, the Panel acknowledges that the available infrastructure and physical resources are sufficient for running the programme efficiently.

- The Panel learned during interviews that all computing services are managed and maintained by the IT Centre *via* an internal online help-desk system. This includes maintenance of software, laboratory resources, network, internet connectivity and any technical support. However, the Panel notes that the computers in the department laboratories date back to 2015. The Panel also notes that senior student exit surveys which have been utilized to evaluate the adequacy of resources, indicate that the computers are not sufficient. Thus, the Panel recommends that the College should ensure that there is a systematic mechanism for regular maintenance of the department's computer laboratories and for measuring their adequacy.

- There are appropriate arrangements to ensure the health and safety of students and staff on campus stated in the Occupational Health and Safety Programme. The visibility of Health and Safety signs and instructions was confirmed during the Campus Tour.

Indicator 2.4: Management Information Systems

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

Judgment: ***Addressed***

- UoB employs the Student Information System (SIS) to record and manage information regarding students' admission, registration progression, and graduation, as well as course evaluation, approval of grades, grade appeals, academic advising, and quality assurance related data analysis reports. The SIS is used effectively by students, faculty members, and administrators to enable informed decision-making.

- The Panel received samples of generated tracking reports of the utilization of e-learning. However, no tracking reports for the utilization of computer laboratories were received. During the virtual interviews, it was reported that such reports are generated only if an incident is taking place. Thus, the Panel recommends that the College should develop and implement a mechanism to keep track of the utilization of computer laboratories, to be used to inform the decision-making process.

- There are policies and procedures in place to ensure the security of learners' records and accuracy of results, such as several access authentications, and access control to ensure the integrity, confidentiality, and protection of data. There is also an IT risk management plan which includes regular backups on different servers on and off campus. The Panel notes that the awarded certificates and transcripts are accurate in describing the achieved learning by students, and are issued in a timely manner.

Indicator 2.5: Student Support

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

Judgment: ***Addressed***

- There is appropriate student support in terms of library, e-learning and e-resources, guidance and care and arrangements are in place for inducting newly admitted students at the university, college and department levels. The adequacy of induction and student support services confirmed during the virtual interviews.

- As per the, academic advising supports students in achieving graduate attributes and learning outcomes. With the support of the SIS, academic advisors can monitor the progress of the students and provide them with necessary advice to improve their performance. The Panel notes that students at risk of academic failure can be easily identified through the SIS. A demonstration of academic advising through the SIS was provided to the Panel during the virtual site visit. The Panel notes that only a few advising comments were entered in the system. Hence, the Panel recommends that the College

should encourage academic advisors to keep detailed records of their advising in the SIS. Besides academic advising, the Panel confirms that UoB provides career guidance services and support to its students, to help them prepare for work and plan their career paths.

- The Panel notes that there are appropriate provisions to ensure the support of students with special needs and that support is maintained for both genders, with no evidence of discrimination between male and female students having been observed. This was confirmed during the virtual interviews. Moreover, the Panel notes that the provided support services are regularly assessed through surveys and improved in line with students' needs. This was very clear during the Covid-19 pandemic. Overall, the Panel acknowledges the appropriate support and services provided by UoB to its students and encourages the Department of Mathematics to hold special tutoring or recitation classes, especially for the special needs, at-risk and under probation students. The classes can be given by high achievers of senior undergraduate students or master students.

Standard 3

Academic Standards of Students and Graduates

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

Indicator 3.1: Efficiency of the Assessment

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

Judgment: ***Addressed***

- The Panel notes that there are valid and reliable assessment methods, as seen in the provided evidence, that are in line with current good practices in terms of the level of assessments' complexity and meet the academic standards of the programme. However, evidence shows that a previous review of the course portfolios by the QAAC had highlighted many assessment-related problems which have been mostly resolved but there are some issues that still need to be addressed effectively by the Department, such as the use of more formative assessment methods as well as group and project-based assessment methods in the course syllabi, as elaborated on in Indicator 1.5.

- The Department utilizes appropriate mechanisms to ensure the alignment of assessments with learning outcomes and graduate attributes. These include the utilization of the NQF guidlines as well as the university's outcome-based assessment approach IDEAS to map the CILOs to the PILOs, which are also mapped to the PEOs and the UILOs and to choose appropriate assessments which are verified by the QAC and through the internal and external moderation procedures. The Department also develops Course Assessment Reports to analyze the achievement of CILOs and ASERs to evaluate the overall achievement of the PILOs. Nonetheless, the Panel is of the view that the mapping of CILOs to PILOS and PILOs to PEOs and UILOs should be revisited as previously explained in Indicator 1.2.

- The Panel finds that there are appropriate mechanisms explained in the SER to ensure that graduates' achievements meet the PILOs. The Department evaluates the student's achievements of PILOs through CILOs' assessment and collects data regarding the progression and achievements of graduates. Regular surveys are also conducted to assess the satisfaction of employers and alumni with the achievements of PILOs and PEOs.

- The implementation and improvement of the assessment process is monitored through several mechanisms which are explained clearly in the SER and confirmed during interviews. These mechanisms include the internal and external moderation procedures which are implemented to ensure validity, reliability, and consistency of assessments. The Head of Department (HoD) and the Moderation Committee monitor the implementation of these procedures. Faculty members are required to prepare course portfolios including

assessment reports that have action plans for addressing the CILOs and PILOs that have not been met. The Department QAC follows up on implementation and prepares Course Portfolios Reports, PILOs Assessment Reports, and Improvement Plans. The College Quality Assurance Office (QAO) and the University QAAC coordinates with the Department QAC to further monitor the implementation and improvement of the assessment process. Overall, the Panel acknowledges that the assessment is effective and aligned with learning outcomes to ensure attainment of the graduate attributes and academic standards of the programme.

Indicator 3.2: Academic Integrity

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

Judgment: ***Partially Addressed***

- The academic integrity related policies and procedures, including those related to ethics and research, are well-documented and disseminated *via* the university website, and known by staff and students as confirmed during the virtual interviews. Faculty members and students are informed during induction sessions about the academic integrity regulations. Furthermore, the Student Guide which contains an overview of related academic integrity policies and procedures is provided to students and made available through the UoB website.

- The Panel notes that the implemented processes for deterring and detecting plagiarism within the Department, as explained in the SER, are inconsistent with the Regulations for Deterring Academic Plagiarism. Turnitin and SafeAssign are used by faculty and students within the Department as plagiarism detection tools. Although, the university's regulations do not define any fixed acceptable percentage of similarity identified by these tools, they clearly define the difference between minor and major plagiarism offences, where copying even few sentences (less than a paragraph) without proper acknowledgement is considered an offence and penalties are applied depending on the severity and type of offence. In the College of Science, however, the acceptable percentage of similarity is defined to be 25% or less, and any similarity percentage that is above 25% is considered plagiarism. However, the Panel finds that the students are allowed to re-submit their work unlimited number of times to lower the similarity score even if it is much more than 25%, as confirmed by faculty and students during interviews. When asked to provide evidence of plagiarism cases, the Department reported that there is not any such case in the programme, although evidence confirms the existence of a student's work with a similarity percentage of more than 25%. This clearly violates the University Regulations for Deterring Academic Plagiarism as well as the Avoid Plagiarism Policy of the College of Science. Thus, the Panel recommends that the College should revise its decision regarding the acceptable percentage of similarity in Turnitin or SafeAssign

originality reports to ensure that any plagiarized content is not acceptable in line with Regulations for Deterring Academic Plagiarism.

- Based on the examined evidence, the Panel affirms that suspected cases of cheating and academic misconduct during examinations are recorded, and appropriate actions are taken. Such cases are reported to the College Misconduct Committee to investigate the incidents with the corresponding students and instructors and issue the appropriate recommendations in line with the university regulations.

Indicator 3.3: Internal and External Moderation of Assessment

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

Judgment: ***Partially Addressed***

- The Panel acknowledges that the University has formal and appropriate procedures for internal and external moderation of assessments and the selection of moderators, explained in the Moderation of Assessment Regulation. Evidence shows that the Department designs a Moderation (Course Rolling) Plan with a list of courses and their assessments to be internally or externally moderated. The moderation plan is required to have two cycles, each to be executed in two academic years where every course in the programme should be internally moderated at least once in each cycle. At the beginning of each semester and as confirmed by evidence, the Departmental Moderation Committee follows up on implementation of the plan and appoints for each course an internal moderator who is a faculty member familiar with the course topics and objectives. The moderation regulations define the external moderator as an academic, employer or an expert in the field of the programme but fails to specify the rules and procedures for selecting, nominating, and appointing the external moderator. Thus, the Panel recommends that the College should define clear and appropriate rules and procedures for the selection, nomination, appointment, re-appointment, exclusion, and approval of the external moderator.

- As can be seen in filled moderation forms, the reliability, consistency, appropriateness, and accuracy of assessment are validated during the internal pre-assessment moderation, while the accuracy, consistency, and fairness of marking are verified in the internal post-assessment moderation. The external moderator checks the validity of the assessment, the reliability of the marking process, and the quality of students' attainment. However, the evidence provided shows that external moderation was not implemented before the second semester of 2020-2021, and only the final examinations of six courses have been externally moderated since then. Therefore, the Panel recommends that the College should ensure full adherence to the University Moderation of Assessment Regulations regarding the moderation of major assessments and the subjection of all the programme's major courses to external moderation at least once within the duration of the programme

to ensure the effective contribution of the moderation process to the review and improvement of the programme and its courses.

- The Moderation Committee collects and studies all internal and external moderation forms at the end of the semester and develops a moderation analysis report which may contain recommendations to the QAC and the HoD to follow up on implementation. Three samples of moderation analysis reports were provided, but none of them contained any recommendations for improvements to the courses or the programme. The QAAC and QAC also monitor the overall implementation and evaluate effectiveness of the moderation. The Panel requested extra evidence demonstrating the evaluation of the effectiveness of the internal and external moderation, but none was provided. The Panel recommends that the College should develop and implement formal and appropriate mechanisms for monitoring, evaluating, and assuring the effectiveness of the programme's internal and external moderation process.

Indicator 3.4: Work-based Learning

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

Judgment: ***Addressed***

- Unlike the 2017 study plan of the programme, the new 2021 study plan has a compulsory one -credit 'Internship' (MATHS 398) course that should be taken by students after passing 85 credit-hours, as confirmed during interviews. The course is designed to be taken during a summer session of eight weeks with a total of 373 notional hours which is equivalent to 37 NQF Credits as explained in the course syllabus and mapping scorecard.

- The Panel acknowledges that the University has appropriate policy and procedures stated in the Internship Guidelines to manage the work-based learning process and ensure an equivalent experience amongst all students. The work-based learning at the College of Science is coordinated by the College Students Training Committee in collaboration with the University Professional Training Office. The Panel confirms that the roles and responsibilities of the internship providers, academic supervisors, work-based training supervisors and students are defined clearly in the Internship Guidelines and communicated to students and staff. However, the Panel is of the view that the University should add the Internship Guidelines to the list of references in the course syllabus of MATHS 398 and upload it to the University's website to be accessible by all relevant stakeholders including internship providers, and work-based training supervisors.

- The course syllabus of MATHS 398 clearly states the CILOs which are mapped to the PILOs. The Panel, however, suggests enhancing the CILOs to be more consistent with the requirements stated in the Internship Guidelines. The Internship Guidelines and the course syllabus of MATHS 398 clearly explain the assessment process which is

appropriate in terms of content and level. The student's achievement of learning outcomes is assessed by both academic and training supervisors using special evaluation forms and well-defined marking rubrics. Furthermore, there are clear arrangements documented in the Internship Guidelines to evaluate and improve the effectiveness of work-based learning and its contribution to the achievement of the PILOs. Consistent implementation of the assessment and effective contribution to the achievement of PILOs needs to be assured by the Department in the future when the students register in the Internship course.

Indicator 3.5: Capstone Project or Thesis/Dissertation Component

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

Judgment: ***Partially Addressed***

- The 2017 study plan includes an elective capstone project course which was made compulsory in the 2021 study plan. The Panel confirms that the CILOs of the capstone project are clearly defined and contribute to the achievement of the PILOs. Furthermore, the Panel notes that the roles and responsibilities of supervisors and students are clearly stated in the Senior Project Guidelines and are communicated to all stakeholders as stated in the SER and confirmed during the virtual interviews. Examined evidence shows that the College and Department organize regular induction sessions and workshops to students where all related regulations, responsibilities and procedures are explained. However, the Panel advises the University to ensure that the Senior Project Guidelines are posted on the university website for all faculty and students. Furthermore, the Panel encourages the College to develop a Senior Project Handbook explaining all regulations, procedures, and expectations of the capstone project in more details, to ensure consistency and smoothness of implementation and to be more consonant with the requirements specified in the Senior Project Guidelines.

- The Panel found evidence of monitoring and review of the progress of students and their satisfaction with the supervision process and the resources available to carry out their projects. Students' satisfaction is assessed through senior student exit surveys, and progress of students is monitored by the Senior Project Committee in collaboration with supervisors, as stated in the Senior Project Guidelines and confirmed during interviews. However, the Senior Project Guidelines do not specify the minimum number of required supervision meetings or the supervisor's progress reports and do not explain how these reports will be recorded and stored. Furthermore, the provided evidence of progress reports are very simple emails sent to the HoD that do not contain any detailed information about the current status or the progress made by the student. Thus, the Panel recommends that the College should specify the minimum number of required supervision meetings and supervisor's progress reports, develop special forms for

recording and summarizing these reports, and store them electronically (maybe *via* the SIS) to allow easy search/retrieve and generation of summarized reports regarding the effectiveness of supervisions.

- As per the SER and provided evidence, there are rigorously implemented mechanisms for the assessment of the capstone project to ensure that it is at an appropriate and similar level of equivalent programmes. Furthermore, the Panel notes that there is a mechanism for monitoring related implementations and improvements of the course. The Department and College Senior Project Committees manage and monitor the senior project related procedures, ensure consistent implementation, and propose improvements when necessary. The Panel, however, is of the view that the QAC and external moderators should review and assess samples of senior projects to further ensure consistency and quality of assessment and achievements of capstone projects. Hence, the Panel advises the College to ensure that external moderators as well as the QAC, QAO, and QAAC have more active roles in monitoring, assessing, and improving the quality of capstone project outcomes and related implementations.

Indicator 3.6: Achievements of the Graduates

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

Judgment: ***Addressed***

- After examining evidence of sample projects of students, Course Assessment Reports, and ASERs, which incorporate an overall summary of the contribution of each course to the achievements of PILOs, the Panel notes that the level of students' achievements based on careful scrutiny of students' assessed work is appropriate and reflects their ability to create and innovate.

- The provided statistical data shows that the year-on-year progression, retention, and length of study are generally consonant with those of equivalent programmes. The retention rate was above 84% during the last four academic years and the average length of study for all graduates of the academic years 2016-2022 was around 5.5 years, where around 22% of the students graduated after six years, given an indication that the year-on-year progression of the students is reasonable for the four-year programme.

- The data regarding student progression and graduate destinations is collected *via* surveys and used to ensure that academic standards are met. Analysis results of the 2021-2022 Alumni Survey, where 45 (out of 151) of the 2017–2021 graduates responded, are used to ensure that the graduate achievements are consonant with the academic standards of the programme. However, the Panel notes the small response rate of the survey and the fact that a high percentage of the graduate destinations is still unknown. Thus, the Panel recommends that the College should develop and implement an efficient formal

mechanism to collect, study, and analyze more exact data about the destinations of all graduates of the programme to ensure that academic standards are met.

- There is evidence of graduate and employer satisfaction with the graduates' profile. The 2021-2022 alumni survey shows that around 80% of the respondants rated their academic experience as either outstanding or above average and more than 80% of them agreed that they possess good skills such as critical thinking, written commuincation, and basic research, IT, and professional and ethical responsibilites. Similarly, in the 2021-2022 employer survey, two (out of only three) employers indicated that the Department successfully equipped its graduates with the required skills to succeed in their professional life. The 2019-2020 employer survey, where seven only responded, shows that 80% of the employers believe that the programme graduates are successful in mathematics related fields. The Panel advises the Department to implement mechanisms that would help address the low response rate of the alumni and employer surveys, so as to solicit credible feedback regarding their satisfaction with the graduates' profile.

Standard 4

Effectiveness of Quality Management and Assurance

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

Indicator 4.1: Quality Assurance Management

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

Judgment: ***Addressed***

- UoB has appropriate documented policies, processes, and regulations for the needs of the programme, which are communicated to all relevant stakeholders *via* the university website and as printed and distributed documents, as confirmed during interviews. The Panel recognizes that some of the policies and procedures were reviewed and revised, however, regular revision for some policies was not established. For example, the Programme Quality Assurance and Enhancement Policy has not been reviewed since its approval in 2015, although the policy clearly states that it should be 'reviewed and revised as necessary every three years or more frequently as laws or regulations change.' Thus, the Panel recommends that the University should ensure regular revision of its policies and regulations.

- The Panel acknowledges that the University has a clear Quality Assurance Management System (QAMS) in relation to the programme, which functions at different levels. The Panel examined samples of QAAC, QAO, QAC, and departmental council meeting minutes and relevant quality assurance reports and concludes that there are mechanisms to ensure consistent implementation of policies and procedures across the College. The University Quality Assurance and Accreditation Executive Committee (QAAEC) and QAAC in collaboration with the College QAO and the Department Council and QAC manage, monitor, and ensure consistent implementation of all quality assurance-related policies and procedures as scheduled in the Departmental Quality Assurance Operational Plan.

- The Panel notes that academics and support staff understand quality assurance and their roles in ensuring effectiveness of provision, as shown in interviews. Furthermore, faculty members participate in the implementation of quality assurance policies and procedures (e.g., preparing course portfolios, moderating assessments, evaluating PILOs and CILOs, soliciting feedback from stakeholders, and developing ASERs), as demonstrated by the provided evidence. Moreover, evidence shows that the College QAO provides quality

assurance capacity building and training workshops for academic and administrative members.

- As stated earlier, the implementation of the QAMS at the Department is monitored by the QAAEC, QAAC, QAO, QAC, and Department Council guided by the Department Quality Assurance Operational Plan. QAAC conducts internal quality reviews for the programme as per the Internal Quality Review Policy and Procedure. The Panel notes that the QAAC conducted a course portfolio audit for the programme in 2012 and an internal review of the QAMS for the programme in 2019. Furthermore, the College of Science is seeking to adopt the electronic system ACADEM to help collect information and generate reports about the efficiency of the QAMS. However, systematic and regular improvement of the University QAMS was not established. The Panel advises the University to develop a formal mechanism to systematically and regularly monitor, evaluate, and improve the efficiency of the University and College QAMS.

Indicator 4.2: Programme Management and Leadership

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

Judgment: ***Addressed***

- The organizational chart of the College is appropriate for the management of the programme. The leadership and management of the programme includes the Dean of the College, College Council, Director of QAO, HoD, and Department Council. The SER states that the 'College Council is chaired by the Dean of the College and includes in its membership the Heads of Departments, senior faculty members representing each Department, and external members.' However, the Panel notes that the current College Council does not have any representative from the Departments of Mathematics, Biology, and Physics beside the HoDs which does not comport with the University Bylaws. During interviews with senior management, the Panel requested evidence to show that this issue is resolved. The Panel was informed that a request for completing the College Council was submitted to the University Council but has not been finalized yet. Thus, the Panel recommends that the University should ensure that the College Council has a representative faculty member from each Department in addition to the HoD as per the University Bylaws.

- The existing reporting lines are clear and ensure effective communication and decision-making. The HoD oversees both the operational and strategic aspects of the programme, manages the programme with the help of the Department Council and Committees, and reports to the Dean of the College. Every committee at the department level is chaired by a faculty member who reports directly to the HoD. Moreover, the terms of reference for different key management posts and committees are clearly described in the Committees Terms of Reference, the Quality Manual, and the University Academic and Administrative Bylaws. The Panel also finds that these documents in addition to many of the university

policies and procedures such as the Programme Quality Assurance and Enhancement Policy and the Regulations for Offering and Developing Academic Programmes and Courses at UoB explain also where the academic responsibility and the custodianship of the academic standards of the programme rest at the department, college, and institution levels. This was also confirmed during interviews.

- The Panel finds sufficient evidence that demonstrates appropriate management of the programme. The College sets the strategic direction of the programme, provides support, and monitors its progress, while the HoD is responsible for the strategic planning for efficient and effective programme delivery and enhancement as well as resources management and development. Under the leadership of the College Dean, the HoD follows on the daily administrative and academic management tasks of the programme. Moreover, the HoD is supported by the QAAC at the university level, QAO at the college level, and QAC and other committees at the department level to appropriately manage, monitor, evaluate, improve, and assure the quality of the programme. Therefore, the Panel acknowledges that the Programme is managed in a way that demonstrates effective and responsible 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.

Judgment: ***Addressed***

- Examined evidence shows that the Department consistently implements the QAAC Annual Programme Self-Evaluation Process, where at the end of each academic year, an ASER is prepared by the QAC and submitted to the Department Council for further study and actions. The Panel notes that the ASER measures the programme's performance toward achieving its PEOs and PILOs using data collected from course assessment reports, prepared by instructors at the end of every semester. The ASER also considers data and information on faculty members, students, research achievements, and the satisfaction of stakeholders, and concludes with a list of recommendations for improvement on both programme and course levels. Thus, the Panel is satisfied that there are appropriate arrangements at the Department for an annual internal programme evaluation that results in a comprehensive report including recommendations for improvement. The Panel also notes that the HoD, QAC, QAO, and QAAC monitor the implementation of these recommendations. However, some sections of the provided ASERs are not updated. For example, Section 8 of the examined ASERs of the last four academic years contains the same list of recommended improvements without showing the status or progress of achievements. The Panel advises the Department to record the programme's achieved progress in the ASERs, to facilitate monitoring and evaluation.

- The University has a policy for the periodic review of the programme explained in the Programme Quality Assurance and Enhancement Policy and the Regulations for Offering and Developing Academic Programs and Courses at the UoB. The Panel acknowledges that the policy is comprehensive and includes a detailed process for regularly and periodically reviewing the programme, at least once every five years, and considers benchmarking and market needs studies, feedback of stakeholders, and requirements of quality assurance and accreditation.

- The Panel confirms that the periodic review process implemented by the Department in 2020-2021 was generally comprehensive and included feedback from internal and external stakeholders collected *via* surveys and meetings with the SAC and PAC. The implemented process also considered information about the job market needs collected *via* surveys, results of the informal benchmarking study, as well as the requirements of ASIIN accreditation, NQF, and the DHR/BQA. The implementation of the review process and the recommended improvements was monitored by the HoD, QAO, and QAAC. The Panel notes that the implemented periodic review process in 2020-2021 resulted in the revised 2021 study plan of the programme. Thus, the Panel acknowledges that there are mechanisms to ensure proper implementation of the periodic reviews and related improvement plans. However, the Panel notes that the implemented process did not use an external programme evaluator, and hence, the Panel recommends that the College should ensure effective utilization of an external programme evaluator in the periodic programme review process in line with the University Policy.

Indicator 4.4: Benchmarking and Surveys

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

Judgment: ***Partially Addressed***

- Utilizing the University Benchmarking Policy, the Department conducted a benchmarking study in 2019 against 20 similar programmes chosen from 18 American and two regional universities, since there is no university in Bahrain offering a similar programme. The study covered the structure of the curriculum; mainly, the number and type of core/elective courses and frequency of the courses in the 20 universities. Another benchmarking study with eight regional and international universities was done to introduce new courses into the programme. A different study against five universities was also conducted for comparing the PILOs. The Panel agrees that benchmarks and internal and external reference points are used to verify the programme's academic standards and to inform decision making. However, the conducted benchmarking studies were not comprehensive and did not include all major aspects of the learning programme, which is inconsistent with the University Policy. Thus, the Panel recommends that the College should ensure that the implementation of the benchmarking study is comprehensive and covers all major aspects of the learning programme, including course learning outcomes

and teaching/learning and assessment methods, to comport more with the University Benchmarking Policy.

- The Panel acknowledges that there are formal mechanisms for collecting structured comments from all stakeholders. The Department regularly solicits feedback from relevant stakeholders and utilizes them for improving the programme. Feedback from students is collected through course evaluations and senior student exit surveys in every semester and *via* meetings with the SAC once a year; although the Panel advises that SAC should meet at least twice a year. Moreover, the Department periodically runs alumni and employer surveys every two years and collects feedback from the PAC once a year. Moreover, the Panel found sufficient evidence that the collected comments are analyzed and used to inform decisions on the programme. The Department analyzes the results of all surveys, discusses the results in departmental meetings, and develops improvement action plans accordingly. For example, the SER states that the addition of the internship and senior project courses to the new study plan is in sync with the feedback solicited from various stakeholders.

- The Panel notes that there are mechanisms in place to implement the improvements recommended by benchmarking and stakeholders through the Department Council, College Council, and QAC. The HoD, QAO, and QAAC follow up and monitor the implementation of these improvements. Moreover, the Panel acknowledges that the implemented changes are also communicated to stakeholders who are satisfied with the changes implemented based on their feedback, as confirmed during interviews with students, alumni, and the PAC.

Indicator 4.5: Relevance to Labour Market and Societal Needs

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

Judgment: ***Addressed***

- The Panel is satisfied that the PAC has clear terms of reference and includes alumni and employers from public and private sectors. The PAC is chaired by the HoD and meets once a year as per the Departmental Quality Assurance Operational Plan. Evidence shows that the PAC actively participates in assessing and improving the programme. The collected feedback from the PAC is recorded in the minutes of meetings, analyzed, included in the ASER, and used effectively to propose improvement action plans which are discussed in the Department Council. Thus, the Panel confirms that the feedback of the PAC is used systematically to inform programme decision-making and appreciates that the programme has a functioning PAC with clear terms of reference. The Panel, however, recommends that the Department should ensure that the PAC meets at least twice a year, as preferred by the University Policy and requested by the PAC members during interviews. Moreover, the Panel suggests adding more members to the PAC who are experts in the discipline and fully aware of the new trends in the field.

- The Panel acknowledges that there are implemented mechanisms to ensure that the programme meets the labour market, national, and societal needs. To ensure the relevancy and currency of the programme, the Department scopes the labour market and the national and societal needs by conducting surveys to develop a market feasibility study and by utilizing some published general market studies conducted by local and global organizations. The Panel notes that scoping the labour market is one of the tasks in the Departmental Quality Assurance Operational Plan, which is monitored by QAC, HoD, QAO, and QAAC, as confirmed during interviews.

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 Mathematics Programme of College of Science offered by the University of Bahrain.

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

1. The periodic review of the programme has resulted in a new curriculum that is well-structured and meets the requirements of the National Qualification Framework and international norms reflected in Accreditation Agency for Study Programmes in Engineering, Informatics, Natural Sciences and Mathematics (ASIIN) accreditation.
2. The methods used for teaching in the programme support the attainment of programme aims and intended learning outcomes.
3. The Department has made efforts to organize an international conference on Emerging Trends in Pure and Applied Mathematics in 2021.
4. The University promotes continuous professional development through the Unit for Teaching Excellence and Leadership, E-learning Center, and Quality Assurance and Accreditation Centre, which encourages faculty members to obtain professional certificates such as Postgraduate Certificate in Academic Practice.
5. The programme has a functioning advisory committee with clear terms of reference.

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

1. Ensure that the potential risks, especially those related to the quality of the programme, its delivery and academic standards are regularly and correctly identified, completely documented, and effectively dealt with.
2. Develop and implement a comprehensive operational plan to achieve the Department mission as well as the strategic goals of the College and the University.
3. Incorporate teamwork and leadership-based skills in the programme intended learning outcomes and course intended learning outcomes and revise the mapping of course intended learning outcomes to programme intended learning outcomes and the mapping of programme intended learning outcomes to university intended learning outcomes and to programme educational objectives to ensure full coverage of the university graduate attributes and programme objectives.

4. Ensure effective utilization of recent research findings and current professional practice in course materials and teaching and learning activities.
5. Extend the use of formative methods to other courses and incorporate them in the course syllabi.
6. Ensure that the College Booklet and the University website contain the most updated admission criteria for the programme.
7. Develop a mechanism for regular revision of the admission policy in light of student performance and feedback from relevant stakeholders, in addition to national and international benchmarks.
8. Speed up the process of hiring new faculty to reduce the workload of faculty as well as the student-to-faculty ratio.
9. Appoint a laboratory assistant for the department computer laboratories to provide technical support to staff and students.
10. Ensure there is a systematic mechanism for regular maintenance of the department computer laboratories and for measuring their adequacy.
11. Develop and implement a mechanism to keep track of the utilization of computer laboratories to be used to inform the decision-making process.
12. Encourage academic advisors to keep detailed records of their advising in the Student Information System.
13. Revise the decision taken by the College of Science regarding the acceptable percentage of similarity in Turnitin or SafeAssign originality reports to ensure that any plagiarized content is not acceptable in line with Regulations for Deterring Academic Plagiarism.
14. Define clear and appropriate rules and procedures for the selection, nomination, appointment, re-appointment, exclusion, and approval of the external moderator.
15. Ensure full adherence to the University Moderation of Assessment Regulations regarding the moderation of major assessments and the subjection of all the programme's major courses to external moderation at least once within the duration of the programme to ensure the effective contribution of the moderation process to the review and improvement of the programme and its courses.
16. Develop and implement formal and appropriate mechanisms for monitoring, evaluating, and assuring the effectiveness of the programme's internal and external moderation process.
17. Specify the minimum number of required supervision meetings and supervisor's progress reports, develop special forms for recording and summarizing these reports, and store them electronically (may be via the SIS) to allow easy search/retrieve and generation of summarized reports regarding the effectiveness of supervisions.

18. Develop and implement an efficient formal mechanism to collect, study, and analyze more exact data about the destinations of all graduates of the programme to ensure that academic standards are met.
19. Ensure regular revision of the university policies and regulations.
20. Ensure that the College Council has a representative faculty member from each department in addition to the Head of Department as per the University Bylaws.
21. Ensure effective utilization of an external programme evaluator in the periodic programme review process in line with the University Policy.
22. Ensure that the implementation of the benchmarking study is comprehensive and covers all aspects of the learning programme including course learning outcomes and teaching/learning and assessment methods to comport more with the University Benchmarking Policy.
23. Ensure that the Programme Advisory Committee meets at least twice a year, as preferred by the University Policy.