Directorate of
Higher Education Reviews
Programme Review Report

University of Bahrain
College of Science
Master in Big Data Science and Analytics
Kingdom of Bahrain

Site Visit Date: 31 October - 2 November 2022

HA061-C3-R061

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Acronyms

ASER	Annual Self-Evaluation Report
BQA	Education & Training Quality Authority
CGPA	Cumulative Grade Point Average
CILO	Course Intended Learning Outcomes
CoS	College of Science
DHR	Directorate of Higher Education Reviews
HEC	Higher Education Council
ILO	Intended Learning Outcome
IT	Information Technology
ITC	Information Technology Center
LJMU	Liverpool John Moores University
MBDSA	Master in Big Data Science and Analytics programme
NQF	National Qualification Framework
PAC	Programme Advisory Committee
PADC	Programme Administrative Committee
PEO	Programme Educational Objective
PILO	Programme Intended Learning Outcome
QA	Quality Assurance
SAC	Student Advisory Committee
SER	Self-Evaluation Report
SIS	Student Information System
ToR	Terms of Reference
UILO	University Intended Learning Outcome
UoB	University of Bahrain

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I. Introduction

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

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

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

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

Standard 1: **The Learning Programme**

Standard 2: **Efficiency of the Programme**

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

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

The Review Panel (hereinafter referred to as 'the Panel') decides whether each indicator, within a standard, is 'addressed', 'partially addressed' or 'not addressed'. From these 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	

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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.

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II. The Programme's Profile

Institution Name*	University of Bahrain
College/ Department*	College of Science
Programme/ Qualification Title*	Master in Big Data Science and Analytics
Qualification Approval Number	
NQF Level	
Validity Period on NQF	
Number of Units*	7
NQF Credit	
Programme Aims*	1. Work successfully as big data scientists or analysts in a variety of related career fields. 2. Pursue research activities in several related areas involving big data science and analytics. 3. Pursue professional development to be recognized as professional big data scientists or analysts. 4. Enhance society's development through the effective use of the knowledge and skills specific to big data science and analytics.
Programme Intended Learning Outcomes*	a) Demonstrate broad and deep knowledge for the concepts, terminologies, techniques in the context of big data science and analytics. b) Identify and formulate practical problems in a variety of big data applications. c) Design and conduct effective data-driven experiments in a variety of professions to meet specific needs within the available resources and the existing constraints. d) Use advanced statistical tools, specialist software and computing technology effectively for big data acquisition, quality evaluation, management and manipulation that involves storing, cleaning,

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	exploring, visualizing, and analyzing big data.
	e) Provide a critical evaluation for the existing techniques in terms of applicability, effectiveness and efficiency and develop creative techniques to handle big data issues.
	f) Extract valuable information from structured and unstructured big data and transform this information into actionable decisions.
	g) Communicate important information in relation to big data appropriately to suit the target audience.
	h) Demonstrate ability to work individually and collaboratively to handle complexity and diversity of big data problems.
	i) Demonstrate awareness of ethics, responsibility and consequences in relation to collecting and using big data.
	j) Conduct scientific research in relation to big data in order to handle challenged real situations.
	k) Pursue life-long learning through continuous professional development in the field of big data science and analytics.

* Mandatory fields

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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	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	Partially 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	N/A

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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	Partially Addressed
Indicator 4.4	Benchmarking and Surveys	Addressed
Indicator 4.5	Relevance to Labour Market and Societal Needs	Partially Addressed

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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 Master in Big Data Science and Analytics (MBDSA) programme is delivered by the College of Science (CoS) at the University of Bahrain (UoB). It was officially launched on the 1st of April 2019 and the first cohort was registered for the academic year 2019–2020. UoB has detailed Regulations for Offering and Developing Academic Programs and Courses and various documents were provided to be used as guidelines for programme design. Before the launch of the programme, a benchmarking and a local market study were conducted. The Panel is satisfied that the implemented regulations have ensured the programme is fit for purpose.

- The MBDSA programme has been developed in partnership with Liverpool John Moores University (LJMU) and designed in accordance with the UK Quality Code for Higher Education including the Framework Higher Education Qualifications in the UK. Though the MBDSA programme was not formally placed on the National Qualifications Framework (NQF), the programme was designed to match level 9 on the NQF that reflects master degree', according to the Self-Evaluation Report (SER).

- Detecting academic risks and dealing with them effectively were evident from internal and external moderation through the partnership with LJMU; Programme Administrative Committee (PADC), Board of Study, Student Advisory Committee (SAC) and Programme Advisory Committee (PAC) meetings; in addition to various surveys.

- The title of the programme is concise and adequately reflects the type and content of the qualification. The title is the same or similar to those used internationally for similar programmes.

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- The Panel is of the view that the programme aims, which are phrased in the form of Programme Educational Objectives (PEOs) are appropriate and mapped to the CoS mission, and the UoB mission and strategic goals. The PADC ensures that the aims contribute to the achievement of the mission and strategic goals. Nevertheless, the Panel have found no evidence that aims are regularly revised in consultation with relevant stakeholders and advises this be done.

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*

- In its Transformation Plan, UoB has defined seven strategic pillars. It has also set six University Intended Learning Outcomes (UILOs) which all programmes should relate to. The Panel notes that the Programme Intended Learning Outcomes (PILOs) are appropriately written and mapped to the PEOs and the UILOs. As such, the Panel is satisfied that generic graduate attributes are defined at the institutional level and embedded within the programme in terms of Intended Learning Outcomes (ILOs).

- The Course Intended Learning Outcomes (CILOs) have been defined for every course including the 'Thesis' (BDSA 609) course and have systematically been mapped to the PILOs. Overall, the defined CILOs are appropriate for the level and contents of the courses. However, the Panel could not find evidence that any course or CILO actually cover the ethics and data security aspects related to Big Data. Moreover, the Panel found no evidence of benchmarking PILOs and CILOs with NQF and international programme requirements. The Panel, thus, recommends that the College should ensure the coverage of ethics and data security in the context of Big Data in the CILOs and the course contents. The Panel also recommends that the College should benchmark PILOs and CILOs against the NQF requirements and international standards.

- UoB has defined an Excel-sheet-based mechanism, which uses the mappings of CILOs to PILOs to ensure that the latter are covered in each course and these course-based results are used to constructively ensure that the programme courses collectively contribute to attaining all the PILOs. The Panel acknowledges that this is systematically implemented but notes that for some courses all CILOs are achieved with exactly the same percentage which is uncommon. The attainment of PILOs was also indirectly checked through a graduates' survey and detailed semester-based student surveys. The Panel has found the latter informative.

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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: *Addressed*

- The MBDSA is organised as a three-semester programme, in the first two of which three courses are taught per semester and the third one is devoted to work on a thesis. The sequencing of the courses is fixed in the programme structure. In spite of this, the courses syllabi documents contain no prerequisites to any of the course. The Panel recommends that the College should define the prerequisites for courses, where applicable, especially that the students are accepted from different backgrounds.

- The student workload is fair and according to international standards for similar programmes. Nevertheless, the Panel questions the appropriateness of scheduling a course lecture and laboratory as five hours in a row, end of the day for students most of whom are employed elsewhere. This concern was actually raised by students during Board of Studies meetings (between UoB and LJMU programme faculty members and student representatives) and is confirmed during the virtual interviews. Therefore, the Panel suggests that the College reconsider the course scheduling to ensure that it is appropriate in light of the students being employed.

- The MBDSA programme was designed according to UoB's Teaching and Learning Policy and Regulations for Offering and Developing Programs and Courses, besides, the programme was validated by LJMU. Also, evidence was given of PAC meetings, Board of Study meetings and SAC meeting to discuss, among other things, the appropriateness of the programme structure and content balance. The Panel is of the view that the programme structure and contents are appropriate and that the course syllabi and portfolios take into account the cultural and linguistic sensitivities of Bahrain. Nevertheless, the Panel agrees with the students who raised concerns about the heavy load of the Machine Learning course, which is covering too many important topics and techniques. The Panel, thus, suggests revising the course content.

- The used textbooks and suggested additional references are appropriate for the respective courses. Recent research findings are used in the 'Thesis' (BDSA 609) course. The 'Research Methods' (BDSA 601) course, which is a compulsory course, trains the students of the programme on research principles and ethics. The assessment of the 'Thesis' (BDSA 609) course was defined in accordance with the UK Quality Code for Higher Education and in line with the UoB Teaching and Learning Policy.

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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*

- UoB's Teaching and Learning Policy explicitly refers to the use of varied teaching strategies and activities that make the students active learners and enable them to develop skills for lifelong learning. The teaching and learning methods used in the MBDSA courses are appropriate for covering the material through lectures, laboratory work, assignments, and projects; and are in line with the institution's Teaching and Learning Policy and what is done internationally.

- Students have expressed their overall satisfaction with the learning environment through the 'Student Representative Surveys' document, Board of Study meetings and End-of-Semester Evaluations. This was confirmed during the virtual interviews with students and alumni.

- Though the programme courses are well-structured, and their contents formally defined, the students were encouraged either through the assignments and projects or additional references to be more independent learners. Also, evidence was found of the students being encouraged to submit papers to and participate in conferences and present their course project works in a workshop. The Panel appreciates that the programme has been able to produce graduates with evidenced lifelong learning skills.

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*

- UoB has a detailed assessment framework that covers policies and procedures of all programmes offered by the University. In the Guide to Students Rights and Duties' document, the students can find details of their rights and obligations. Moreover, policies that address academic misconduct, cheating, and plagiarism are clearly defined and regulated and the right to appeal is given to the students.

- There is evidence of the strict application of the assessment framework, and this was confirmed during the virtual interviews with PADC members and faculty. The framework includes internal and external moderation through the partnership with LJMU; where evidence has been provided showing that assignments, projects, and final examinations

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are systematically moderated leading to various improvements. Even the adoption of the open-book assessments for the final examination because of the COVID-19 restrictions had to be formally approved and regulated. Hence, the Panel is satisfied with the thorough nature of the assessment framework and its implementation for the MBDSA programme.

- In the first and second semesters, six taught courses have three assessments each: practice, a project, and a final examination. The assignments (practice) are more formative, while the project and final examination are summative. The marking criteria are clearly defined and the students are informed about them. Evidence was found of communication between the faculty members and the internal and the external moderators *via* proper channels whereby the marking criteria were enforced in the three types of assessments. According to the university's policies and procedures, assessment feedback is to be provided to the students within well-defined time limits after the assessments. The Student Representative Surveys have shown an overall satisfaction of the students with the assessments and their grading and their usefulness.

- An internal assessment strategy for the MBDSA has been established by the PADC based on the institution's guidelines for assessment. This strategy enforces a number of principles of attainment of ILOs, fairness, variety, research-orientedness, communication, clarity, promptness of the feedback, etc. This is further enforced trough the partnership with LJMU and the moderation process. During the virtual interviews, the students and alumni expressed their satisfaction with the fairness and transparency of the grading mechanism.

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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.

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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: *Partially Addressed*

- The University adopts general admission requirements for graduate studies, in addition to specific entry requirements for the programme. Both policies are gender neutral. The policies are published on the university website, and clearly communicated to the wider public and future applicants. The Higher Studies Regulations state that the applicants to the Master programmes shall pass the department's written examination to verify their academic standing. However, the Panel found, as confirmed during the virtual interviews, that there is no written examination for the MBDSA programme.

- The admission criteria mainly focus on the students' Cumulative Grade Point Average (CGPA), English language skills, statistics/mathematics and Information Technology (IT) background. These requirements fit with the nature of the programme and are consistent with similar programmes offered internationally. While there is a clear process to ensure the applicants meeting the CGPA and English level requirements, there is no formal process to confirm the applicants' background in statistics/mathematics and IT. Therefore, the Panel recommends that the College should ensure that the admission process is in line with UoB's admission policy and includes clear documentation of the assessment of the applicants' statistics/mathematics and IT skills.

- The PADC approved a list of remedial courses for inadequately prepared students. However, there is no evidence for such courses having been offered for students, also, how the committee decided what courses were assigned for each student accepted in the programme was not clear. Therefore, the Panel recommends that the College should develop a clear mechanism to provide appropriate remedial courses for inadequately prepared students to enter and progress in the programme.

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- The programme entry requirements were updated twice based on recommendation from the PADC. However, no evidence was provided on revising the admission requirements of the programme based on students' performance, feedback, and benchmarks. Therefore, the Panel recommends that the College should ensure that the stakeholders' feedback, and regional and international benchmarking exercises are taken into consideration when revising the admission criteria of the programme.

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: *Addressed*

- UoB has clear policies and procedures for recruitment, induction, appraisal and promotion of academic staff. The Panel was provided with evidence on the consistency in transparent implementation of recruitment and promotion procedures. The Panel was also provided with evidence which refers to an orientation workshop attended by all newly appointed academics to learn about UoB's regulations and practices. Furthermore, faculty members undergo a rigorous appraisal process, based on explicit evaluation criteria and constructive performance rubrics. Transparency is implemented *via* the ability of faculty members to access their appraisal forms through the Civil Service Bureau website. The Panel is satisfied that appropriate procedures are in place.

- The webpage of the Deanship of Graduate Studies and Scientific Research provides key information about research activities and funding support at UoB. The Panel was provided with evidence detailing the strategic research plan for the CoS, the quality of the college's scientific research, and the research support. During the visit, the Panel was provided with evidence on the mechanisms to identify professional development needs, which the Panel is satisfied with.

- There are five faculty to deliver the six courses offered in the programme: one faculty (programme coordinator) from the CoS and four faculty from the College of IT (One full professor and four assistant professors). Four faculty members are specialized in computer science, and one faculty member is specialized in statistics. Most of the academic faculty delivering the courses in the programme are overloaded because of teaching and other duties within their own departments. The Panel recommends that the College should reduce the teaching and advising load of the faculty who participate in delivering the MBDSA programme.

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- The University through its Unit for Teaching Excellence and Leadership, that is accredited by UK-Advanced-HE, provides faculty development opportunities that lead to gaining Higher Education Academy fellowship. The Panel appreciates the Unit of Teaching Excellence and Leadership's efforts in providing activities such as the Postgraduate Certificate in Academic Practice programme in collaboration with York St. John University and the Higher Education Academy's continuous professional development programmes.

- Based on the UoB faculty guidebook, the university monitors faculty turnover and overall performance on a regular basis through a formal appraisal system. The Panel is of the view that there are no significant staff retention issues but suggests that the College may consider applying exit surveys and analysis to improve the monitoring of staff turnover.

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: *Addressed*

- There are adequate number of classrooms that cater for the programme needs (size and numbers) based on current enrolment numbers. During the site tour, the Panel visited the two new computer laboratories: the High-Performance Computing laboratory and the Artificial Intelligence laboratory. During the site visit, the Panel viewed the supercomputer, and learned that it was newly purchased to cater for the needs of the programme, and that every student has an account on this computer. During interviews with students, they confirmed having accounts to access the supercomputer, however, they raised their concerns of not being able to access the cloud services remotely. The Panel recommends that the College should provide students with appropriate cloud services, and tools to help them gain practical skills as specified in the PILOs and programme aims, especially that the students are in their largest majority employees and cannot use the available physical facilities.

- The library is equipped with computers to facilitate access to subscription-only electronic resources using university-specific login details. The library also provides an Inter-library loan service *via* partnerships with internationally distinguished libraries. However, the video tour and site visit revealed that the study spaces within the library are limited. The Panel was provided with the current plan to expand the library, albeit without targeted deadlines. The Panel advises the University to prioritize the expansion of the physical library amenities, to allow more students' access, and revise the existing expansion plan by adding a timely framework for its implementation.

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- During the virtual site visit, the Panel was provided with evidence on the formal mechanisms to ensure the maintenance of the existing CoS resources and evaluate their adequacy. However, no evidence was provided on the maintenance plan or the mechanism of the College of IT to ensure the adequacy and maintenance of the computer laboratories and other related resources of the programme, which the programme's facilities belong to. Given that these facilities are crucial for the programme, the Panel suggests that the College of IT develop a formal mechanism to ensure the maintenance of the resources and measure their adequacy.

- None of the provided evidence indicates the health and safety measures implemented within the University in general and CoS or College of IT in specific. However, the tour of laboratories and different facilities indicated the provision of safety and emergency notices.

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*

- The SER provides details of the use of the Student Information System (SIS) for the management of student information, academic records and course evaluation reports, as well as for supporting the decision-making process in terms of student progression, staff appraisal and contract renewal. This was shown to the Panel during the live demonstration of the SIS. Tracking reports on the utilization of laboratories, e-learning facilities, etc., were discussed with senior management during interviews, and the Panel learnt that they use generated reports from the SIS to inform decision-making.

- To ensure the integrity, confidentiality, and protection of the students' data, the SIS employs several access authentication and access control measures. The access records are audited on a regular basis to ensure compliance. The Information Technology Centre also implements a risk management plan, which calls for regular electronic backup and data recovery. Overall, the Panel appreciates that IT security is adequately covered.

- As per the evidence provided, the official transcripts issued by LJMU include detailed scores of student's achievements in the courses. During the virtual site visit, the Panel was provided with evidence of a graduation certificate and degree issued by UoB.

Indicator 2.5: Student Support

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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: *Partially Addressed*

- The university website link provided in the SER and the library website indicate several services for students including induction to the library services, e-learning, career guidance, and other social and administrative services. During the site tour visit, the Panel noticed that two staff are available to serve at the two-story library, both are positioned on the ground floor. The Panel, thus, advises the University to provide more staff at the library to assist students.

- The PADC organizes the Induction Day to introduce the accepted students to the programme. However, during the virtual site visit, the Panel learnt from students that no formal orientation was provided for the SIS, library, laboratories, and Learning Management System. Therefore, the Panel advises the College to ensure that the MBDSA students are formally introduced to SIS, library, laboratories, and Learning Management System services.

- As provided in the SER, career guidance is one of the services provided for all UoB students. During the virtual visit, the Panel gathered from the students interview that no formal career counselling was provided. Therefore, the Panel recommends that the College should implement and document formal procedures to provide the MBDSA students with career guidance services and support to help them prepare for work and plan their career paths.

- As per the SER, the programme coordinator serves as the academic advisor for all the students enrolled in the programme. The coordinator helps the students in selecting the topic of their thesis and their supervisors, as well as, providing support to at-risk students. The Panel notes that there are no at-risk students currently in the programme. However, given that the number of students enrolled in the programme is 25 students in the academic year 2021-2022, the Panel is concerned about assigning the responsibility of advising to one person (the Programme Coordinator), who has other duties and responsibilities in addition to the advising load. Therefore, the Panel recommends that the College should assign more academic advisors, other than the programme coordinator, to support the MBDSA students, including potential at-risk students, in achieving graduate attributes and learning outcomes.

- The statistics provided in the SER show that the percentage of female students admitted to the programme was close to the number of male students. The University established a collaborative project 'Forsati for Her' with the United Nations Development Programme, Microsoft, Think Smart, and Tamkeen to train a large number of female programmers. This

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collaboration established a laboratory in the College of IT where female students could receive training. Such project contributes to ensuring equal opportunities for both genders. The Panel appreciates the university's initiatives to ensure equal opportunities for both genders through the collaborative project 'Forsati for Her' with the United Nations Development Programme, Microsoft, Think Smart, and Tamkeen.

- The services provided for students in the programme is assessed through the SAC, which provides feedback regarding the courses, programme and services. The SER summarizes the main recommendations from SAC to improve various aspects of the programme including the support services. However, there is no evidence of any discussion of these recommendations, or any plans to implement them. Thus, the Panel recommends that the College should introduce formal mechanisms for assessing the suitability and quality of the services provided to the students in the programme and improving them.

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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.

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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*

- The MBDSA course assessments are of three types: (1) practice, which includes varied types of assignments (30%); (2) project, which can be done individually or in a team (30%); and (3) final examination, so far organized online as an open-book examination (40%). This blend of assessment methods reflects current good practices and corresponds to the sought academic standards. The provided portfolio (assessments, solutions, and student answers samples) shows assessments that are of good quality and up to the expected standards.

- The mechanisms that are in place start with the regulations which require that the used assessments are comprehensively aligned with the learning outcomes and graduate attributes. Moreover, for each course including the thesis, the course description defines the CILOs and their mapping to the PILOs. For each course, an assessment Excel Sheet is prepared, which contains the CILOs and their mappings to the PILOs, a CILOs Report Worksheet in which achievements of the various CILOs are calculated, and a PILOs Report Worksheet which averages the achievement of the various PILOs. The Panel acknowledges this effort for ensuring the alignment of the assessments with the learning outcomes and graduate attributes. Nonetheless, the Panel noted that the CILOs are not mentioned in the course's examination problem statements, and thus advises the College to ensure that CILOs are systematically included in the course's examination problem statements.

- All the assessments underwent internal and external moderation. Internal moderators were among the faculty members of LJMU and the external moderator was selected by LJMU. This is an additional component of the mechanisms that are in place to ensure the attainment of the learning outcomes and graduates attributes. Furthermore, during the interviews, the Panel was informed that every five years the programme is assessed in terms of the PEOs achievement.

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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*

- UoB has a rich, detailed set of policies and procedures to ensure academic integrity. They are stated in the Regulations of Professional Conduct Violations and the Anti-Plagiarism Policy. These are published to the attention of the students and faculty alike in the Guide to Students Rights and Duties, Faculty Members Bylaws, UoB Faculty Guide and the institution's website. The SER states that the plagiarism detection tools, Turnitin and Blackboard (SafeAssign), are 'widely adopted by the faculty members to detect plagiarism in written submitted assignments'. During the virtual interviews, the faculty members and programme senior management confirmed the systematic use of plagiarism detection software. No cases of student cheating/misconduct/plagiarism have been brought to the attention of the Panel.

- It was confirmed during the virtual interviews that a threshold of 25% of similarity is set into the detection tools and, if it is exceeded, the faculty members look into the details of the generated report in case of false positives. The Panel learnt during interviews that some faculty may enforce a lower threshold, such as 15%. In all cases, the Panel is of the view that a 25% similarity threshold is too high and recommends that the College should review the Anti-Plagiarism Policy and reduce the accepted similarity percentage.

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*

- UoB has appropriate and formal policy and procedures for internal and external moderation of the assessments. Given the partnership with LJMU, internal moderation used to be done by one of the LJMU's faculty members on all assessments, while external moderation was done by an expert selected by the LJMU to cover all aspects of the programme not just the assessments. Though the SER illustrates the communication that goes on between the course instructors and the Programme Coordinator on one hand and between the latter and the Link Tutor at LJMU and between the latter and the internal/external moderators on the other hand, the Panel has not found evidence of formally stated procedures to support this communication. Besides, the evidence of

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communication on internal moderation consisted in some email exchanges, rather than formal forms that got filled in and submitted to the Programme Coordinator. As to external moderation annual reports, only one was submitted for the academic year 2019-2020. For the following two years, no formal yearly report was submitted; just the main points were reported and passed on. Therefore, the Panel recommends that the College should ensure that internal and external moderation are submitted using validated forms.

- The provided evidence of communication of the results of internal moderation and external examination of assessments shows that they have been consistently performed for the three cohorts by LJMU and reported by the Link Tutor at LJMU to the programme coordinator at UoB. The communication of the moderation did lead to improvements of the assessments as well as of more general aspects related to the programme organisation, such as adjusting the assessment time based on its complexity, preparing more comprehensive model answers, etc..

- The evaluation of the effectiveness of the internal and external moderations process was left to LJMU as stipulated by the three-year contract that was signed between UoB and LJMU with respect to the MBDSA programme. Nevertheless, the Panel learnt from the interviews that the contract will not be renewed. Furthermore, the Panel wasn't provided with evidence on how the programme implements and assesses the overall process of internal and external moderation after terminating the contract with LJMU. Therefore, the Panel recommends that the College should implement a rigourous mechanism to ensure that the overall process of internal and external moderation is assessed for effectiveness and improvements are made on the programme accordingly.

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: *Not Applicable*

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*

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- The MBDSA programme consists of six courses taught during two semesters and a Thesis research work done during a third semester. The Thesis is an opportunity for a student of the programme to bring together the knowledge acquired in the other courses to solve a theoretical or practical problem. As such, this capstone project is the culmination of the learning process of the student and greatly contributes to the achievement of the programme ILOs. UoB's Higher Studies Regulations delimit the responsibilities of the supervisor and the student and organize the flow of the thesis research steps, from the definition of its topic till examination and reporting. The Higher Studies Regulations are communicated to all, especially on the university website.

- There is evidence of the existence of a Thesis Progress Report which is filled out by supervisors at the end of each semester, to assess the progress of a student on his/her thesis. On the other hand, no evidence was provided to demonstrate that the students are given an opportunity to express to what extent they are satisfied with the supervision of their theses. The Panel recommends that the College should implement surveys to collect students' feedback on their satisfaction with the supervision of their research work.

- The Thesis Writing Guide Handbook guides the students on all aspects related to both the format and the content of the dissertation. The criteria for Thesis mark distribution are precisely defined (70% on the Thesis and 30% on the *viva)*. Upon examination, a report is written by the internal and external examiners and the Thesis Discussion Committee Decision is taken and a formal document is signed. The Panel is of the view that this practice is appropriate and at a similar level of equivalent programmes.

- Evidence of the monitoring of a student's thesis research work was provided, but it does not show that it is conducted regularly. During the virtual interviews, the Panel was informed that this monitoring is required once a semester, although a thesis should theoretically be completed in one semester. The Panel, thus, recommends that the College should conduct more frequent monitoring of thesis research progress.

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: *Addressed*

- The topics of the programme courses and the students' theses are varied and interesting. Twenty-seven papers were produced by the first two cohorts as a result of their first-year courses. Although the conferences they published in are the International Conference on Data Analytics for Business and Industry organized by UoB and technically sponsored by the Institute of Electrical and Electronics Engineers Bahrain section and the Europe, Middle

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East and Africa Business Analytics Conference, the Panel is, nonetheless, of the view that these results are praiseworthy. Moreover, the students have been active in organising the Big Data Week, programmed twice a year by the PADC, and participating in other workshops. The Panel appreciates the students' active participation in organizing Big Data related events, as a proof of the quality of the graduates.

- As mentioned earlier in this report, the MBDSA was first offered in the academic year 2019-2020. The SER reports that seven out of seven students of the first cohort graduated in the minimal period of 1.5 years. The SER shows also that, as to the second cohort, 12 students have graduated and four are expected to graduate, but no dates have been given. These longer periods taken by the second cohort have been confirmed during the virtual interviews. The Panel notes that there may be an issue that would need a closer scrutiny here and recommends that the College should keep clear statistics of the ratio of admitted students to successful graduates, retention and the length of study to enable the programme administration to improve the programme based on the analysis of such statistics.

- The SER mentions the existence of a Senior Exit Survey, but no further details or survey data are presented or discussed. Likewise, nothing is said about employer satisfaction with the graduates' profile (see under Indicator 4.3). The Panel notes however that during the virtual site visit interviews with three alumni and one employer, they were very pleased with the quality of the graduates' profile.

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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*

- The SER details, with evidence, the existing UoB policies for Quality Assurance (QA) at the institutional level. The Programme Quality Assurance and Enhancement Policy (dates 2015) specifies the programme QA objectives and explains the assessment cycles for the courses and programmes. The Panel acknowledges the clearly documented QA policies at the institutional and college level yet recommends that the University should regularly update its quality assurance policies and procedures.

- At the college level, the College Quality Assurance Committee monitors the QA compliance, assessment, and accreditation activities. In addition, there is a College Quality Assurance Office, which is managed by a director who reports directly to the Dean and the Quality Assurance and Accreditation Executive Committee. At the programme level, the PADC works with the Director of the College Quality Assurance Office to implement QA policies and improve the programme.

- Based on interviews with faculty members and supporting staff, combined with evidence of workshops held to explain the QA policies to academic and administrative staff, the Panel finds that the faculty have sound understanding of the QA system and their role in ensuring its effective provision. The Panel notes the provision for collaboration with LJMU on certain aspects to improve the programme QA management. However, the aspects of systemic monitoring and formal evaluation procedures were not evident which is central in QA. Hence, the Panel recommends that the College should document the implementation of the university's policies and procedures to monitor, evaluate and improve the quality assurance management system at the programme level.

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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*

- CoS has an appropriate organizational chart for the management of the MBDSA programme, with clear reporting lines that support communication and decision-making across the College. The PADC is headed by the Dean, who guarantees good representation and communication at the college and university levels. The Programme Coordinator is also present in several vital committees across the College. The Panel was provided with evidence of regular meetings for the PADC and progress reports, where the various reporting lines at department, college and university levels are indicated.

- The Quality Manual describes the Terms of Reference (ToR) for all committees and the job descriptions for senior leadership positions. The formation letter for the committees defines their roles and responsibilities. In addition, all the committees' ToRs are clearly described and published by the Quality Assurance and Accreditation Center. The Panel acknowledges the clear ToRs for the various committees at UoB.

- The SER provides details of the various academic and administrative responsibilities at the university, college and programme levels. The Programme Coordinator ensures the smooth running of the teaching and learning activities and manages any emerging mandates.

- During the interviews with faculty and staff, it became evident to the Panel that too much responsibility is placed on the Programme Coordinator. While the Coordinator has shown responsible leadership, the effectiveness of the programme management could be impacted. The Panel is of the view that overwhelming one faculty with administrative and academic responsibilities could affect the proper QA management of the programme, and hence stresses on its recommendation under Indicator 2.5 to reduce the Programme Coordinator's workload.

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: *Partially Addressed*

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- The policy for the annual and periodic reviews of programmes is stipulated in the Quality Assurance and Enhancement Policy. Given that the programme was first offered in the academic year 2019-2020, it has not undergone a periodic review to date. The Panel urges the College to conduct the periodic review of this programme as per the related UoB policies and procedures.

- The PADC prepared a comprehensive Annual Self-Evaluation Report (ASER) for the academic year 2020-2021. The ASER evaluated the success in achieving the CILOs and PILOs according to student achievements. It also includes recommendations for improvement based on feedback collected from PAC, SAC, Alumni Survey and Employer Survey, as well as suggested actions to implement some of these recommendations at the programme and the college levels. However, the consistent periodicity of this annual report was not evident as the reports for the current year was not provided. Furthermore, no sufficient evidence was provided on monitoring the implementation of the ASER recommendations or their evaluation. The Panel, therefore, recommends that the College should monitor and evaluate the implementation of the annual 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*

- The UoB Benchmarking Policy provides the framework for different entities of the University to undertake benchmarking. The MBDSA programme was developed in 2019 based on benchmarking against similar programmes in several regional and international universities. The Panel noted that this benchmarking study focused mainly on the course content. The programme being very recent, accepting its third cohort this year, it is too early to expect regular benchmarking, other than the one which has been conducted before introducing the programme in 2019. The Panel advises the College to ensure, in the next periodic review of the programme, that the benchmarking report of the programme covers different aspects of the academic and administrative activities and support services etc.

- The SER provides details on collecting structured comments from internal stakeholders, including SAC and PAC, as well as students and alumni surveys. There is also evidence on collecting information from external stakeholders *via* the market study conducted in 2018. The Panel was provided with the SAC meeting report of 2022 and alumni surveys. The only data available to the Panel on employer surveys was provided in the ASER of 2020-2021, which does not include the number of employers surveyed, and refers only to academic staff. The ASER of 2020-2021 provides evidence that the collected comments from internal (PAC, SAC), and external (alumni survey, employers survey) stakeholders are

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considered, discussed and utilised to inform decisions, with the aim to improve the programme. However, interviewed alumni and PAC members indicated the lack of regular and formal communication to seek their feedback and measure their satisfaction with implemented improvements. Hence, the Panel recommends that the College should ensure that the mechanisms for collecting structured comments from internal and external stakeholders are implemented on a regular basis and evaluate the effectiveness of the mechanisms used for communicating to stakeholders the implemented changes or improvements based on their feedback.

Indicator 4.5: Relevance to Labour Market and Societal Needs

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

Judgement: *Partially Addressed*

- The MBDSA programme has two advisory committees, SAC and PAC. The SER states that the PAC comprises mainly graduates from the first cohort. The PAC formation decision names three members, without specifying whether they are experts, employers or alumni, yet the PAC members, who attended the interview with the Panel, were all alumni. The Panel notes also that the formation decision of the PAC, issued in October 2021, states that it is valid for the academic year 2021-2022, though it states at the bottom that this decision expires on 1 September 2021. The Panel assumes this is a typo. Overall, though, the PAC members clearly stated, during the interview with the Panel, the lack of regular meetings and formal communication to seek their feedback. Therefore, the Panel recommends that the College should ensure that the PAC includes members from discipline experts, employers and alumni, the feedback of the PAC is used systematically to inform programme decision-making, and that the PAC members are informed with improvements done based on their feedback.

- A market study was conducted during the programme development phase in 2018. Results of this study revealed big data analysis as one of the main skills required in the labour market. This is supported by a recent independent online survey (TAMKEEN) ranking expertise in big data analysis as third on the top ten list for highest in-demand jobs in Bahrain. No further market scoping data were collected, or labour market studies conducted since then. The Panel urges the College to regularly conduct a comprehensive market needs analysis.

- The results from the 2018 labour market study, surveys, SAC and PAC meetings are discussed by PADC and considered in the ASER. There is evidence on the translation of the collected data and comments to actions and implemented measures to improve the programme. However, the monitoring and review processes of such measures were not

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evident to the Panel through the interviews and provided evidence. The Panel, thus, recommends that the College should review and evaluate the mechanisms used to ensure that the programme meets labour market and societal needs.

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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 Master in Big Data Science and Analytics 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 programme has been able to produce graduates with evidenced lifelong learning skills.

2. The Unit of Teaching Excellence and Leadership's efforts in providing activities such as the Postgraduate Certificate in Academic Practice programme in collaboration with York St. John University and the Higher Education Academy's continuous professional development programmes.

3. The Information Technology security is adequately covered.

In terms of improvement, the Panel recommends, to the University of Bahrain, the following:

1. Ensure the coverage of ethics and data security in the context of Big Data in the course intended learning outcomes and the course contents.

2. Benchmark the programme intended learning outcomes and the course intended learning outcomes against the National Qualification Framework requirements and international standards.

3. Define the prerequisites for courses, where applicable.

4. Ensure that the admission process is in line with university's admission policy and includes clear documentation of the assessment of the applicants' statistics/mathematics and information technology skills.

5. Develop a clear mechanism to provide appropriate remedial courses for inadequately prepared students to enter and progress in the programme.

6. Ensure that the stakeholders' feedback, and regional and international benchmarking exercises are taken into consideration when revising the admission criteria of the programme.

7. Reduce the teaching and advising load of the faculty who participate in delivering the programme.

8. Provide students with appropriate cloud services, and tools to help them gain practical skills as specified in the programme intended learning outcomes and programme aims.

9. Implement and document formal procedures to provide the students with career guidance services and support.

10. Assign more academic advisors, other than the programme coordinator, to support the students, including potential at-risk students, in achieving graduate attributes and learning outcomes.

11. Introduce formal mechanisms for assessing the suitability and quality of the services provided to the students in the programme and improving them.

12. Review the Anti-Plagiarism Policy and reduce the accepted similarity percentage.

13. Ensure that internal and external moderation are submitted using validated forms.

14. Implement a rigourous mechanism to ensure that the overall process of internal and external moderation is assessed for effectiveness and improvements are made on the programme accordingly.

15. Implement surveys to collect students' feedback on their satisfaction with the supervision of their research work.

16. Conduct more frequent monitoring of thesis research progress.

17. Keep clear statistics of the ratio of admitted students to successful graduates, retention and the length of study to enable the programme administration to improve the programme based on the analysis of such statistics.

18. Regularly update its quality assurance policies and procedures.

19. Document the implementation of the university's policies and procedures to monitor, evaluate and improve the quality assurance management system at the programme level.

20. Monitor and evaluate the implementation of the annual review recommendations.

21. Ensure that the mechanisms for collecting structured comments from internal and external stakeholders are implemented on a regular basis and evaluate the effectiveness of the mechanisms used for communicating to stakeholders the implemented changes or improvements based on their feedback.

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22. Ensure that the programme advisory committee includes members from discipline experts, employers and alumni, the feedback of this committee is used systematically to inform programme decision-making, and that its members are informed with improvements done based on their feedback.

23. Review and evaluate the mechanisms used to ensure that the programme meets labour market and societal needs.

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