Directorate of Higher Education Reviews

Programmes-within-College Reviews Report

Bachelor in Computer Science

College of Arts and Science

Applied Science University

Kingdom of Bahrain

Date Reviewed: 9-11 May 2016

HC077-C2-R077

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Acronyms

ASU	Applied Science University
BCS	Bachelor in Computer Science
CILOs	Course Intended Learning Outcomes
CS	Computer Science
HEC	Higher Education Council of the Ministry of Education, Kingdom of Bahrain
DHR	Directorate of Higher Education Reviews
HoD	Head of Department
IEEE -ACM	Institute of Electrical and Electronic Engineers/Association for Computing Machinery
ILO	Intended Learning Outcome
MIS	Management Information Systems
NQF	National Qualification Framework
PILOs	Programme Intended Learning Outcomes
QA	Quality Assurance
QAU	Quality Assurance Unit
BQA	Education & Training Quality Authority
QAAC	Quality Assurance and Accreditation Centre
RACI	Responsibility, Accountability, Consulted, Informed Document
SER	Self Evaluation Report
SIS	Student Information System

The Programmes-within-College Reviews Process

A.   The Programmes-within-College Reviews Framework

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

Programmes-within-College Reviews have three main objectives:

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

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

Indicator 1: **The Learning Programme**

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

Indicator 2: **Efficiency of the Programme**

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

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

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

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

The arrangements in place for managing the programme, including quality assurance, give confidence in the programme.

The Review Panel (hereinafter referred to as 'the Panel') states in the Review Report whether the programme satisfies each Indicator. If the programme satisfies all four

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Indicators, the concluding statement will say that there is 'confidence' in the programme.

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

Table 1: Criteria for Judgements

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

B. The Programmes-within-College Reviews Process at the Applied Science University

A Programmes-within-College review of the programmes offered by the College of Arts and Science of Applied Science University was conducted by the DHR of the BQA in terms of its mandate to review the quality of higher education in Bahrain. The site visit took place on 9-11 May 2016 for the academic programmes offered by the college, these are: Bachelor in Computer Science; Bachelor in Graphic Design; and Bachelor in Interior Design.

Applied Science University was notified by the DHR/BQA in 22 June 2015 that it would be subject to a Programmes-within-College reviews of its College of Arts and Science with the site visit taking place in May 2016. In preparation for the review, Applied Science University conducted its college self-evaluation of all its programmes and submitted the SER(s) with appendices on the agreed date in 4 February 2016.

The DHR constituted a panel consisting of experts in the academic field of (Computer Science, Graphic Design, and Interior Design) and in higher education who have experience of external programme quality reviews. The Panel comprised five reviewers.

This Report provides an account of the review process and the findings of the Panel for the Bachelor in Computer Science based on:

(i)   analysis of the Self-Evaluation Report and supporting materials submitted by the institution prior to the external peer-review visit
(ii)   analysis derived from discussions with various stakeholders (faculty members, students, graduates and employers)

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(iii)   analysis based on additional documentation requested and presented to the Panel during the site visit.

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

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

C.   Overview of the College of Arts and Science

The College of Arts and Science is one of the three ASU colleges, which was established in 2004 and currently the University offers nine undergraduate and five postgraduate programmes on a range of disciplines. The mission of the College of Arts and Science is aligned to ASU vision and mission, seeking to 'offer academic programmes of applied nature in arts and science that achieve the requirements of high quality learning and teaching as well as the latest development in knowledge and the relevant scientific research'. ASU vision, mission, objectives and values are published in the University Catalogue and are accessible on its website, emphasizing the university's role in the promotion of a culture of learning and research. The University has also a number of academic cooperation agreements with several educational institutions including Helwan University, Bahrain Institute of Public Administration, and the Association of Arab and European Universities (AEUA). The College of Arts and Science offers three bachelor degrees in Computer Science, Graphic Design and Interior Design through two departments: Department of Computer Science and Department of Design and Arts. The statistics provided by the College during the site visit indicated that there were 167 students registered in the three programmes in the second semester of the academic year 2015-2016 and the total number of academic staff was 17 full-time faculty members.

D.   Overview of the Bachelor in Computer Science

The College of Arts and Science first offered the Bachelor in Computer Science (BCS) in the academic year 2007-2008, graduating its first batch comprising two students in 2011- 2012. BCS is currently offered through the Department of Computer Science and currently, there are eight full-time faculty contributing to the programme. The objective of the BCS programme is 'to prepare graduates that are able to contribute to

the development of the IT sector in the Kingdom of Bahrain and in the Gulf region'. According to the statistics provided by the institution, currently there are 42 students registered in the BCS programme and 28 students have graduated since the commencement of programme.

E. Summary of Review Judgements

Table 2: Summary of Review Judgements for the Bachelor in Computer Science

Indicator	Judgement
1: The Learning Programme	Satisfies
2: Efficiency of the Programme	Satisfies
3: Academic Standards of the Graduates	Does not satisfy
4: Effectiveness of Quality Management and Assurance	Satisfies
Overall Judgement	**Limited Confidence**

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1.   Indicator 1: The Learning Programme

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

1.1   The BCS programme has a clear academic planning framework that ensures linkage with the vision and mission of the University and College as well as with programme aims and Programme Intended Learning Outcomes (PILOs), and Course Intended Learning Outcomes (CILOs). The relationship between the mission of the University and College is well articulated in the SER. The BCS programme has five aims that are classified as Knowledge and Understanding, Application, Lifelong Learning, Innovation, and Social Context. The contribution of these aims to the college mission is demonstrated in the SER. For example, the BCS Knowledge and Understanding aim 'produce graduates who have an up to date knowledge and understanding of information and communication technology (ICT) which is relevant to the needs of industry' is connected to the portion of the College mission that reads 'The College of Arts and Science is committed to offer academic programmes of applied nature in arts and science that achieve the requirements of high quality learning and teaching as well as the latest development in knowledge.' Moreover, their contribution to the university mission may be inferred using the linkage between the mission of the University and College. The BCS programme has also established aims for each of the four levels (years) of the programme. These aims reflect a progression in student ability from one level to the next. The aims of level one focus on knowledge and comprehension of fundamental computer science topics while the aims of level four are directed toward advanced topics and skills such as synthesis and evaluation. The Panel appreciates that there is a clear academic planning framework for the programme ensuring linkage with the vision and mission of the University and College as well as with programme aims.

1.2   The BCS curriculum, requires the completion of (135) credits of which 21 are compulsory university requirements, six are university elective requirements, 21 are compulsory college requirements, 75 are compulsory major requirements, and 12 are elective major requirements. The number of credits is in line with international expectations for a baccalaureate degree. The curriculum was revised in 2012-2013 and 2013-2014. The current version of the curriculum was the result of benchmarking conducted by the BCS faculty and feedback from the BCS advisory board and an external programme review. The curriculum is delivered over eight semesters (4 years). There is a study plan that partitions the courses that comprise the curriculum according to the year in which each course is to be taken. The plan also shows the pre-requisite structure. The Panel notes that while the pre-requisites are generally satisfactory, the Discrete Mathematics and Linear Algebra courses, which are, respectively, taken in the first and second years, are not shown as a pre-requisite to any course taken in subsequent years. However, the knowledge and skills acquired in these courses are necessary for successful completion of some of the courses scheduled

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for later in the curriculum. As an example, Discrete Mathematics is usually specified as a pre-requisite to the Data Structures course. In its site visit meeting with the programme faculty, the Panel was informed that ASU is revising the pre-requisite structure to make explicit some of the pre-requisites that are, at present, implicit in the partitioning of courses into years. The Panel encourages the College to expedite this process. On average, students completing the programme in eight semesters would take (17) credits per semester, which reflects a normal workload for an undergraduate programme. Practical experience is obtained through a mandatory internship (CS433), a mandatory graduation project (CS432), and laboratories and homework assigned in various courses. The curriculum, as designed, can be delivered to achieve an appropriate overall balance between theory and practice and between knowledge and skills. The Panel appreciates that the curriculum is organized to achieve an overall balance between theory and practice.

1.3   Course syllabi generally specify the topics expected to be covered in similar courses and the breadth and depth of courses in the BCS programme collectively cover the requirements of the discipline at a bachelor level. The textbooks and references listed in course specifications are also appropriate and current editions are used. Course specifications use the DHR template and are complete with respect to this template. Although a considerable amount of benchmarking has been done, there is no evidence that this benchmarking was done at the content level rather than just at the course title or knowledge area level. For example, the BCS benchmarking documents provide a correspondence between course titles, but not content, in the BCS and courses in similarly named regional and international programmes. The benchmarking with one university comprises a general statement that the 'programme covers comprehensive topics that are favourably comparable with similar programmes that are offered by British universities', recommendations on course substitutions for college and major requirements, and a few editing suggestions. The benchmarking against recommended professional society curricula is limited to verifying that the BCS programme has a course in each of the knowledge areas specified in the recommended curricula. Specifically, the Institute of Electrical and Electronic Engineers/Association for Computing Machinery (IEEE-ACM) recommended that the curriculum should have 18 knowledge areas and the BCS programme includes 15 of these; the areas not covered are Human Computer Interaction, Parallel and Distributed Computing, and Systems Fundamentals. The Panel recommends that the College should ensure in its next periodic review of the programme that the BCS course syllabi cover topics on human computer interaction, parallel and distributed computing, and systems fundamentals.

1.4   The programme specification includes four PILOs in the Knowledge and Understanding Category, three in the Subject Skills including Practical Skills category, three in the Cognitive (Intellectual) Skills category, and three in the Transferrable Skills category; which are linked to the five aims of the BCS programme. These PILOs are clearly stated in the programme specification and are in general appropriate for a

baccalaureate degree. Nonetheless, there are, two syntactical issues with the PILOs—(a) Several of the PILOs list a subset of computer science topics. However, it is not evident how this subset was chosen and why other, possibly more important, topics were excluded. For example, the second outcome in the Knowledge and Understanding category is 'Identify the programming concepts, methodologies, …'. It is not evident why the ability to identify is limited to this subset of computer science topics. It is also not evident how ASU decided which topics a student should be able to 'explain' and which they should be able to 'identify'. Moreover, some of the knowledge areas of the BCS programme that are listed on the SER (e.g., Graphics and Visualization) are not mentioned explicitly in any of the Knowledge and Understanding PILOs. (b) The three BCS PILOs in the Cognitive Skills category are written more as subject specific skills than as cognitive skills. In fact, the wording of these Cognitive Skills PILOs is quite similar to that of the PILOs for the subject specific skills. Specifically, the Cognitive Skills PILOs 'Analyse, design, and implement data structures, algorithms, and information systems effectively', 'Evaluate and justify proposed design solutions for computer-based systems', and 'Assess and identify a set of solutions to solve a wide range of problems in business and scientific contexts' are, respectively, virtually the same as the Subject Specific Skill PILOs 'Design and analyse algorithms and, write, test and implement computer programs using industry standard programming languages', 'Evaluate computer based systems in terms of general quality attributes', and 'Analyse, assess and apply modelling … business processes'. The Panel discussed these syntactical issues with the BCS programme team, which concurred with the need to reword the PILOs. The Panel recommends that the College should review and revise the PILOs as necessary to ensure that PILOs are more generic and well differentiated.

1.5   Course specifications include CILOs that are categorized into the four areas specified in the DHR template. The SER maps courses to PILOs. However, no mapping between CILOs and PILOs has been done. The Panel examined the provided samples of course files and was concerned with the way the CILOs were presented in some of the courses. For example, in course CS121 (Discrete Mathematics), it is not evident why CILO c1 ('Differentiate and select either the direct method or the contradiction method in order to prove a mathematical statement') is classified as a Thinking Skill rather than as a Subject-specific Skill. Similarly, in course CS214 (Data Structures and Algorithms) the subject specific CILO b1 ('Implement the required data structure and algorithm for solving encounter problems using object-oriented programming'), thinking skills, CILO c1 ('Design and implement an algorithm to manipulate the required data structure to solve problems in context using OOP'), and transferrable skills CILO d1 ('Design and implement assignment to solve problem in team work') are very similar and it is not evident why they have been put into different categories. Furthermore, in course, CS432 (Graduation Project, 1st Semester 2015-2016), the CILOs are written as tasks a student will do during the course rather than as measurable skills a student will possess upon completion of the course. For example, CILO d1 is 'Write a graduation project report that demonstrate the proposed work'. Hence, the Panel

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recommends that the College should review and revise the CILOs ensuring CILOs within the same course are well differentiated, and are mapped to PILOs.

1.6   The BCS programme has a mandatory three-credit internship CS433, which may be taken after a student completes (90) credits. This internship provides students an opportunity to acquire real-world experience and see how what they have learnt relates to a work environment. Although CILOs are specified for each category of the DHR template, the classification of CILOs a1 ('to demonstrate an ability to apply prior knowledge and skills in a work based environment') and a2 ('to demonstrate a capacity to assimilate new knowledge and skills relevant to a work based environment') into the Knowledge and Understanding category is improper. As with other courses, the Internship CILOs are not mapped to BCS PILOs. ASU, however, has an Internship manual that details the processes and procedures, including assessment, of the Internship. It clearly defines the objectives of the internship and the responsibilities of the parties involved. As discussed during the interviews, the head of the Training and Internship Unit is responsible for contacting the relevant organizations and for developing an annual internship plan for prospective students. The academic training supervisors follow up on students' activities and participate in the students evaluation which is based on the evaluation form filled by the training supervisor, the student activity report, attendance, the final report submitted by the student and the presentation of his/her final report. Overall, the Panel appreciates that there is a compulsory internship to support the achievement of PILOs.

1.7   ASU has a learning and teaching assessment strategy which includes a range of teaching methods (interactive lectures, group work, self-learning, e-learning) that are appropriate to the BCS programme. For each category of CILOs, the course specification lists the teaching and assessment methods employed. These methods are well accepted for similar programmes and are aligned with those in ASU's learning and assessment strategy. In meetings with students, the Panel confirmed that methods listed are, in fact, implemented in practice. Further, students are encouraged to participate in learning *via* discussions, group activities, homework, laboratories, and projects. Exposure to professional practice and the application of theory is achieved through laboratories, programming exercises, the graduation project (CS432) and the internship (CS433). In terms of Learning Management System (LMS), ASU uses the 'Moodle' platform, which is substantially used for the Computer Science (CS) courses, where clear directives by the Department Council were given to all CS faculty members to use Moodle in all their courses. The BCS students and alumni the Panel met with were very satisfied with their experience at ASU, the employed teaching methods, and the accessibility of academic staff. The students also mentioned that chat rooms are often used on Moodle to facilitate communication between the CS instructors and had no recommendation for change. The Panel appreciates that there is a formal teaching and learning policy and teaching methods are appropriate and diverse.

1.8   A detailed assessment and feedback policy exists at ASU. This policy includes summative and formative assessment. The policies and procedures are well publicised and communicated through ASU's Website and 'Moodle'. Assessment for most courses in the BCS programme comprises a midterm (30%) and end of term (50%) tests and coursework (20%). Coursework includes homework, laboratories, quizzes, case studies, discussions, and so on. As is appropriate, the internship and graduation project courses are assessed differently using rubrics appropriate to each. In its examination of course files and its meeting with students, the Panel confirmed that the assessment and feedback policy is being followed. During interview sessions with programme faculty, the Panel was informed that ASU is considering a rebalancing of the weights for the tests and coursework to better reflect the importance of practical work (as embodied in coursework) to the CS discipline. The Panel is of the view a more flexible weighting system, one that permits courses that are more practical to weigh practice more than theoretical tests, would be a step in the right direction. The Panel appreciates that the assessment arrangements are appropriate, well disseminated, and transparent.

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

- There is a clear academic planning framework for the programme ensuring linkage with the vision and mission of the University and College as well as with programme aims.
- The curriculum is organized to achieve an overall balance between theory and practice.
- There is a compulsory internship that supports the achievement of the programme learning outcomes.
- There is a formal teaching and learning policy and teaching methods are appropriate and diverse.
- The assessment arrangements are appropriate, well disseminated, and transparent.

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

- ensure in its next periodic review of the programme that the BCS course syllabi cover topics on human computer interaction, parallel and distributed computing, and systems fundamentals
- review and revise the programme intended learning outcomes as necessary to ensure that the intended learning outcomes are more generic and well differentiated
- review and revise the course intended learning outcomes ensuring that the learning outcomes within the same course are well differentiated, and are mapped to PILOs.

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1.11 Judgement

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

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2.   Indicator 2: Efficiency of the Programme

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

2.1   The admission policy is documented in the programme specification and published in the online Student Handbook. This policy requires a 60% score on the secondary school certificate and allows for an exception for students with work experience. Additionally, students graduating from a non-science discipline are required to take four not-for-credit remedial courses—Introduction to Computer Science, Introduction to Mathematics and Statistics, Introduction to Computer Mathematics, and Introduction to Programming. In its site visit meeting with College administrative staff and programme staff, the Panel was informed that students who take these four remedial courses perform better than those who do not. As a result, ASU is considering requiring all admitted students to take these courses. All admitted students are required to take the Oxford English test and their performance on this test determines which English module they must take. The admission policy is reviewed annually as confirmed in the site visit meeting with College Administrative Staff and Programme Staff. As a result of this periodic review, ASU has decided to amend its admission requirements for the BCS programme in 2015-2016 to exclude students from liberal arts as they were underperforming. Students transferring from other institutions are subject to HEC regulations. Transfer credits are awarded following an equivalency check by the BCS programme team. The Panel acknowledges that there is a clear admission policy, which is periodically revised and the admission requirements are appropriate for the level and type of the programme.

2.2   The number of students admitted into the first year of the BCS programme increased from eight in 2012-2013 to 18 in 2015-2016 and in this period, five transfer students were also admitted. The distribution by gender in the last four academic years was (M/F) 6/3, 9/4, 6/4, and 12/6. In the academic years 2012-2013 to 2014-2015 the BCS programme graduated six, four, and seven students with an average GPA of 66.7, 67.33, 74.68, and their average time to graduation in semesters was, 8.66, 9.75, and 8.42, respectively. Only two of the 17 students who graduated in this period secured a grade of Very Good or Excellent. The profile of admitted students, which is limited to a subset of students admitted prior to academic year 2014-2015, shows that these students satisfied the published admission criteria and their high school GPA ranged from 60% to 98%. However, the profile of graduates reveals that few graduates of the BCS programme have a very good or excellent performance. As noted in the paragraph above, the BCS programme offers four remedial courses for students who are inadequately prepared. Students are assigned academic advisors who monitor the academic progress of their advisees. In an effort to improve the average performance of its students, the BCS programme has decided to discontinue the admission of students from liberal arts and is considering requiring all admitted students to take

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the four remedial courses. In doing so, the Panel encourages the College to conduct a formal study that evaluates students' performance against entry level.

2.3   There is a clear organizational structure for the University and College that indicates the management structure of the BCS programme. This structure includes course coordinators, a programme coordinator, Head of Department (HoD), college Dean, Vice President for Academic Affairs, and ASU Council. The roles of faculty members, course coordinators and the programme leader (coordinator) are detailed in ASU Quality Assurance Manual. The management structure ensures a clear and appropriate line of accountability. The programme coordinator supervises the course coordinators and focuses on the daily delivery of the courses and student matters. CS faculty are also able to provide input into the management of the programme through the various departmental standing committees, department council, and faculty meetings. Furthermore, there are students representatives in the Department Council and the College Council. In meetings with the faculty and college staff, the Panel verified that individuals were aware of their responsibilities with respect to management of the BCS programme as well as with the overall programme management structure. The Panel appreciates that there are clear lines of accountability with regard to the management of the programme.

2.4   At the time of the site visit, the BCS faculty comprised seven PhD holders and one MS holder. As evident from their CVs, all are qualified to teach in the BCS programme. With a student body of 42, the student to faculty ratio is suitable. In its meeting with the programme team, the Panel learnt that the institution follows the HEC regulations stipulating that teaching load for Professors is nine credits/semester and that for other PhD holders is 12; the load for non-PhD holders is 15 credits per semester. The academic load of faculty members who have significant administrative responsibilities is reduced by three credit hours. Besides formal teaching, BCS faculty members also participate in committees and advise students. It is the view of the Panel that the teaching, advising, and committee workload is such that faculty are not left with sufficient time to establish and maintain a vibrant research programme and engage in community activities. In its meetings with senior managers and with Quality Assurance (QA) Staff and faculty members, the Panel learnt that ASU has several mechanisms to encourage research. These include the possibility of internally funded research projects, support for travel to conferences, and monetary reward for publishing in journals and conferences. Nevertheless, the contribution of CS faculty members to research and publications is identified as an area for improvement in the SER. There has been also no promotion in the CS Department in the past three to five years. The Panel recommends that the College should assess the workload of teaching staff and ensure they have adequate time for research and community engagement activities.

2.5   ASUs has clear HR policies and procedures that are well documented and in its meeting with BCS faculty, the Panel confirmed that faculty members are aware of these. The timeline and procedure for recruitment is specified by a clear flowchart and

the procedure for promotion is detailed in the Academic Promotion Policy. Faculty appraisal is conducted annually by the HoD and there is a satisfactory induction for new faculty. The Panel studied the appraisal reports and notes that these seem to be limited to an appraisal of teaching. The sample appraisal provided has 21 teaching related assessments and only one (engages in research) that relates to research. This balance is inconsistent with ASUs promotion policy that places more emphasis on research than suggested by the HoD appraisal template. Other components of the promotion policy such as university, community, and professional service are not covered in the appraisal template. Therefore, the Panel recommends that the College should ensure that there is an annual comprehensive evaluation of faculty performance that includes all promotion criteria. ASU's Recruitment and Settlement Policy also mandates exit interviews of departing staff. In the past academic year three faculty who contributed part-time to BCS programme left ASU and they were replaced by three faculty members whose primary employment is with the Computer Science department. In its meetings with senior managers and faculty members, the Panel learnt of ASU's retention programmes that include full support for travel to conferences, monetary rewards for publication, professional development opportunities, and the creation of a supportive environment. Although there has been no promotion in the CS Department in the past three to five years, faculty seemed to be aware of the expectations and process for promotion. The Panel appreciates that there are clear procedures for the recruitment and retention of academic staff.

2.6 ASU has several information systems to enable informed decision-making. These include a Student Information System (SIS) that is linked to the ASU accounting system, an HR management system, and a financial information system. The SIS enables the identification of at-risk students, facilitates online registration, determining a faculty member's lecture schedule and a student's timetable, as well as entering student attendance for each lecture and analyzing assessment results. At its meeting with QA Staff and faculty members, the Panel learnt that ASU is considering the adoption of an electronic system for course files. The Panel acknowledges that ASU has a Student Information System, HR management system, and a financial information system that inform decision making at the programme level.

2.7 ASU has consistent policies and procedures for the authentication and protection of student records. Concerning the student marks, procedures are in place and implemented to ensure that the course marks go through a process of submission, approval by the Department and College, electronic submission through the SIS system, double-checking of the submitted results, and finally validation by the Deanship of Admission and Registration. Student electronic records are secured through IT policies with appropriate data back-up frequencies. Concerning the students physical records, they are systematically scanned and saved in the SIS system, and secured and stored in 'a fire proof safe located in a room that is under CCTV surveillance and accessible only to authorized staff through access control device'. ASU's ICT and Knowledge Management Policy and Procedures manual includes a

policy for information security and backup. This policy is intended to ensure the security of digital and hard copy learner records as well as of other data. Administrative and academic staff confirmed the implementation of the above-mentioned procedures and policy during interviews. The Panel appreciates that the policies and procedures that are in place to ensure the accuracy, reliability and security of student records are appropriate.

2.8   Due to the small number of students in the programme and ASU at large, the currently available number of classrooms and their sizes are acceptable and each one is equipped with a smart data projector and a white board. The sizes are also acceptable for the IT laboratories, which the Panel visited, and the library space, which, additionally, provides a small number of closed study spaces that can accommodate a maximum of two students. ASU also has one auditorium, which takes up to 200 students. The Panel also noted a small recreation room and an open sports court, which is planned to be covered to avoid the high temperatures and humidity levels. During the site visit tour, the Panel noted that the IT laboratories usages are displayed on the door of each one of the laboratories and the Panel was informed that there are always laboratories that are free and thus can be used by the students for their own independent studies and assignments. Nevertheless, the Panel notes that the CS Department lacks specialised laboratories such as ones for courses like "Data Communications and Computer Networks", "Computer Graphics Algorithms", and possibly "Ciphering and Computer Security". During interview sessions with staff, students and alumni, the Panel was informed that students currently work on simulations and software to suit the needs of such courses rather than with appropriate hardware. The Panel recommends that the College should assess the laboratory needs of the BCS courses and appropriately provision laboratories to meet these needs. Furthermore, there did not seem to be adequate informal study space besides the library and the laboratories. During the site visit tour, the Panel also noted that although faculty members have private offices, a few share one with a colleague. The Panel is of the view that for those faculty members who currently share an office (for two) the space is quite small and it can be quite difficult to concentrate while the office mate is receiving some student(s). However, the Panel was informed that the administration plans to build new premises so as to have one office per faculty member. The Panel recommends that the institution should expedite the process and provide appropriate informal study and recreational space/areas to meet the needs of the students. According to ASU 'ICT and Knowledge Management policy and Procedures' all staff of the University are eligible to have an e-mail account' and rules for appropriate use of the university email accounts are clearly stated. This Policy also indicates that the university shall provide high quality internet access, which is provided through leased lines and Wi-Fi connections. During the site visit the interviewed academic staff, the students, and alumni were all very satisfied with the facilities. The alumni also mentioned that they always found what they needed in the e-library and that there was always a laboratory available for their independent learning. Despite being a little small in space, but enough for the needs of the current

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student and staff population, the library displays 23000 books out of which 635 are CS book titles (1430 book copies) and 100 000 e-books available through the university yearly subscriptions to four digital libraries like ACM, Emerald, etc. The Panel appreciates that ASU has modern classrooms and laboratories, and the library is supplemented with a large collection of e-books and e-journals.

2.9   ASU is able to track the usage of the Moodle Virtual Learning Environment and of the Library e-resources using the tracking capabilities built into Moodle and the Library Information System. Reports are generated based on this tracking of the usage of Moodle and of the library. The usage of the CS laboratories is tracked manually, as demonstrated during the site visit tour. Despite the insistence on the use of Moodle at ASU, the generated report on the 3rd Semester 2014-2015 showed a low usage of the system with 20 non-active courses in the College of Arts and Sciences with a percentage of 34%, which is quite high given all the directives that are given at the university level. No specific data was provided per programme. Furthermore, no evidence was given as to how the generated Moodle and library usage reports will be taken into account for decision-making. The Panel acknowledges the availability of tracking systems that determine the usage of laboratories, e-learning and e-resources that generate relevant reports and data and encourages the College to develop a mechanism to utilize the outcomes of these reports.

2.10   There is a Technical Support Unit at ASU with five IT specialists to support the students and staff in their use of the IT facilities and the e-learning system. A staff member is also available at the College of Arts and Science to support the students and staff in the use of the e-learning system. Moreover, the Library has six employees available to assist the students on the use of the library and its online system. Additionally, each laboratory has a staff member to provide the needed assistance to the students and staff. ASU has an Office of Student Social Counselling under the Deanship of Student Affairs and Evening Studies. The role of the office is to help the students who face social or such problems. In addition, a number of seminars are given each year to deal with social problems, learning difficulties, etc.. The 2014-2015 annual report of the Office of Student Social Counselling lists statistics with the numbers of students who have benefitted from different types of counselling. It also shows detailed forms to be filled in by the counsellor on each case. Moreover, each ASU student is assigned to an academic advisor who can advise and guide the student academically and, probably, on various problems that the student could face. Reports are written by the academic advisors each semester and are followed up by the Department Council. ASU also collects a number of surveys to find out about the degree of satisfaction of its students and graduates. These are the new students, graduating students, Alumni survey. Analyses are made of the graduating students survey and Alumni survey although in the latter only one graduate has filled in the survey. The Panel is of the view that all these surveys should help the University to be attentive to the students' feedback so that it can introduce the required improvements. During the site visit touring of the facilities, an explanation was given to the Panel

members that students with disability can reach any point at ASU: special provisions had been made so they can take the lifts and get to any point. Overall, the Panel finds the level of student support satisfactory.

2.11   ASU has a well-defined policy called 'New Student Orientation Guidelines' and the induction is compulsory for new and transfer students. The orientation programme is organized by the Deanship of Student Affairs at the beginning of each semester. It aims to welcome the new students and guide them through the different facilities of the University and its systems (IT, library, etc.) through a tour of campus facilities and series of short seminars delivered by key staff and faculty members. New students are also provided with comprehensive orientation booklets and alternative orientation sessions are arranged for those who were not able to attend the orientation day. Moreover, the University surveys the newly admitted students through the 'new student experience survey' and analyses their feedback. The Panel acknowledges that this survey is particularly important since it can immediately highlight any problem a new student may be facing with respect to his/her new academic or social environment. It should thus give the University a means to quickly identify and respond to the students' needs and to improve its induction of new students. Students interviewed by the Panel during the site visit were all very positive about their induction at ASU. The Panel appreciates that there is clearly defined orientation policy for newly admitted students that meets their needs.

2.12   ASU has a system to track and follow up the students-at-risk. A student who is considered at risk of academic failure is followed up more closely by his/her academic advisor and not allowed to register in any courses without the advisor's prior approval, as confirmed during the interview sessions with college administrative and registration staff, academic advisors, and students. The ASU registration office provides each department with a list of at-risk students. These are easily tracked using the university SIS system. Once identified, the at-risk student needs to formulate an Academic Action Plan, which must be approved by his/her advisor and will have to work accordingly until he/she reaches a good standing. A detailed policy is defined for at-risk students and each advisor is required to follow more closely the at-risk students with very specific forms to fill in regularly. The cases of at-risk students are discussed in the Department Council. The Dean of Student Affairs is also responsible for ensuring that they are given adequate academic support through regular meetings with their academic supervisors and maintain satisfactory progress. The students and alumni that the Panel met during the site visit all praised the support they found in their respective academic advisors. The Panel appreciates that clear policies and procedures are in place to detect and support the students at risk through proper academic advising.

2.13   ASU has made provision for a number of activities that can enrich the students' experience during their years of study. For instance, there is evidence of the visit of several students to a telecom company and the running of a couple of invited seminars, in addition to a large number of seminars and trainings that have been organized by

the Office of Student Social Counselling under the Deanship of Student Affairs and Evening Studies. These seminars dealt with subjects such as social problems and learning difficulties. Formal learning is only supplemented by visits to relevant organizations within the Kingdom, guest lectures, and other activities such as the 48-hour creativity event. Although the Panel appreciates that formal learning is supplemented by a whole set of extra-curricular activities, external seminars, and visits to external entities that enrich the learning experience, it recommends that the College should strengthen the links with professional scientific bodies such as IEEE and ACM through the creation of CS chapters at ASU, as well as local professional bodies such as Bahrain Information Technology Society and Bahrain Society of Engineers. This is especially important since ASU's strategic plan for 2015–2020 emphasises internationalisation and partnerships.

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

- There are clear lines of accountability with regard to the management of the programme.
- There are clear procedures for the recruitment and retention of academic staff.
- There are appropriate policies and procedures in place to ensure the accuracy, reliability and security of student records.
- ASU has modern classrooms and laboratories and the library is supplemented with a large collection of e-books and e-journals.
- There is a clearly defined orientation policy for newly admitted students that meets their needs.
- Clear policies and procedures are in place to detect and support the students at risk through proper academic advising.
- Formal learning is supplemented by a whole set of extra-curricular activities, external seminars, and visits to external entities that enrich the learning experience.

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

- assess the workload of teaching staff and ensure they have adequate time for research and community engagement activities
- ensure that there is an annual comprehensive evaluation of faculty performance that includes all promotion criteria
- expedite the process to build new premises so as to have one office per faculty member and provide appropriate informal study and recreational space/areas to meet the needs of the students
- assess the laboratory needs of BCS courses and provision laboratories to meet the identified needs
- strengthen the links with professional scientific bodies such as IEEE and ACM through the creation of CS chapters at ASU, as well as local professional bodies.

2.16 Judgment

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

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3. Indicator 3: Academic Standards of the Graduates

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

3.1 Generic graduate attributes are clearly defined at the institutional level at ASU. These are translated into the BCS programme aims and ILOs. The programme specification also defines teaching and learning and assessment methods, which are linked to the CILOs. The Panel appreciates that graduate attributes are well defined at the institutional level and translated into the BCS programme aims to which the PILOs are mapped. Nonetheless, the methodology employed to determine the achievement of the PILOs is flawed. For example, the BCS programme has four PILOs that are categorized as Knowledge and Understanding. Whilst courses are mapped to specific outcomes in each of the four categories, the assessment instruments and the course outcomes assessment Excel form only identify the category being assessed rather than the exact PILO. Hence, there is no way to assert that each PILO in each category has actually been achieved. Even if one were to identify with each question the specific PILO being assessed, the employed methodology would fail because several PILOs are the conjunction of simpler outcomes. For example, PILO1 conjuncts principles and concepts as well as several topic areas such as networking, security, and discrete mathematics. With the suggested modification to the current methodology, there would be no way to differentiate a programme that assessed only principles of security from that which assesses both principles and concepts of both security and networking. Therefore graduate attributes cannot be ensured through assessment, as discussed further in paragraph 3.4. The Panel recommends that the College should revise the methodology employed to determine the achievement of the PILOs.

3.2 ASU has a formally established policy on benchmarking. The SER defines the purpose of benchmarking to be ensuring that the 'BCS programme meets local, regional, and international norms and standards'. There is evidence that the BCS programme has been benchmarked at the course level (though apparently not at the course content level) against regional and international programmes. The programme has also been benchmarked against the recommendations of professional bodies such as ACM/IEEE, the 2007 Subject Benchmark Statement of the Quality Assurance Agency for Higher Education – United Kingdom, and the British Computer Society. In addition, the programme was externally evaluated. These benchmarks are discussed during the Department and College Council, the College Quality Assurance Unit (QAU) and the advisory board meetings, and decisions were taken to improve the programme as indicated by the minutes of meetings. These decisions have included changes in the college requirements, changes to the list of required courses, changes to pre-requisites, and addition of new courses. Interviews with the programme team confirm that the BCS curriculum has evolved from a 2012-2013 curriculum to a 2013-2014 curriculum, and most recently to the 2015-2016 one. Although ASU Benchmarking policy put emphasis on formal benchmarking and the need to enter into a memorandum of

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understanding with external parties, there is insufficient evidence of formal benchmarking. Moreover, the scope of benchmarking is limited to the study plan, the number of credits hours, and the aims and the tiles of the courses rather than the content of these courses. Although the benchmarking policy stresses the use of benchmark as a means of assuring standards, the SER states that benchmarking of the achievement of students and the standards of assessment is more complex in the absence of published statistics for the Gulf Region. The Panel recommends that the College should fully implement ASU benchmarking policy and expand the benchmarking activities to include admission criteria, learning resources, the achievement of students and the standards of assessment.

3.3   ASU Learning, Teaching and Assessment Strategy and Assessment and Feedback Policy declare that 'the assessment processes are transparent and clearly communicated to relevant stakeholders'. These are the learners, external examiners, and other stakeholders. Indeed, the Panel notes that policies are well communicated through the university catalogue and course specifications, the university website, and the Moodle platform, in addition to all the material that is sent to the external examiners. This is also the case for assessment feedback, which is well defined in the above policies and there is evidence that it is systematically communicated to the learners. ASU's assessment policy provides a framework whereby the assessment should be an 'effective, appropriate and fair assessment practice that promotes learning'. One of its aims is to 'assess the extent to which learners have achieved learning outcomes'. The programme assessment strategies are defined as having to be formative and summative while ensuring good academic practices, preventing misconducts. The assessment policy also defines the assessment reviewing process, its frequency, and the parties responsible for it. In particular, it states that 'assessment strategies are regularly reviewed and, where appropriate, revised'. The ASU Quality Assurance Manual defines the responsibilities of all the academic staff, course coordinators, and the programme coordinator (leader) in terms of monitoring of the implementation of the policies. There is evidence of follow-up of assessment feedback, which is carried out at the Department Council, the College Council and the Quality Assurance and Accreditation Centre (QAAC), but the Panel has not come across evidence where changes to the assessment scheme have been done. Although, the Panel acknowledges there are clear assessment policies and procedures at the institutional level, the Panel finds the followed procedures related to plagiarism need to be revised. To prevent plagiarism, the CS department forces the students to submit all their final year reports through the Turnitin plagiarism detection system and there is a threshold of 20% similarity that is set across the University, without checking whether this similarity is a problem or not. The Panel also noted several cases of plagiarism that exceeded 20%. The Panel is of the view that no amount of plagiarism should be tolerated and the Turnitin score should only be treated as an alert rather than a definitive threshold. Therefore, the Panel recommends that the College should develop a strict policy with respect to plagiarism, and apply it to all student work, not just final year graduation projects.

3.4   Each course specification defines the assessed ILOs, the teaching methods, and the assessment tools and plan. These ILOs are meant to be defined in line with the mission and programme aims and objectives as explained under paragraph 1.4. A course learning outcome assessment form is used to produce a course learning outcomes assessment report. ILOs are expected to be assessed at course level and collectively at the programme level to ensure that all the PILOs are covered. Moreover, in line with ASU's policies and procedures, the BCS programme uses internal and external moderation of assessment to ensure appropriateness and alignment of assessment with the learning outcomes. The internal and external examiners are asked, when assessing examination questions, to check 'the validity of the questions to assess the learning outcomes of the course'. However, as mentioned under paragraph 3.1, the Panel is of the view that the methodology employed to determine the achievement of PILOs is flawed since there is no way to assert that each PILO in each category has actually been achieved. Moreover, in various courses, e.g. CS 111 (Structured Programming) and CS311 (Design and Analysis of Algorithms), the examination questions are mapped to the outcome categories Knowledge and Understanding, Practical Skills, and Intellectual Skills rather than to CILOs. Likewise, in course CS121 (Discrete Mathematics), assessment instruments indicate only which category of CILO is being assessed rather than the specific CILO. This is true for a number of other courses as well. Furthermore, the internal moderation form specifies the distribution of marks in an examination allotted to each of the four skill types. This distribution is not further broken down into sub-skill types. The form also has subjective questions that do not relate to CILOs as well as questions that assess the extent to which examination questions assess CILOs. These latter questions do not result in an identification of which questions assess which CILOs. So, by knowing the total marks achieved on an examination or even on each question, no system can assess the achievement of an individual CILO. Therefore, the Panel recommends that the College should reconsider the methodology employed to determine the achievement of CILOs and ensure that programme and course ILOs are systematically and exhaustively assessed.

3.5   ASU has a formal assessment policy that includes moderation of midterm and final examination papers. Once an examination is prepared, it is checked by an internal moderator and feed-back is given to the course instructor before the examination date so the latter can make appropriate modifications to the examination accordingly. The internal examiner has clearly stated duties and his/her report is to cover the various facets of course assessment including ILOs. Evidence provided and site visit meetings with faculty members show that, based on the internal examiners' comments, various examination assessments were modified/improved. The Panel notes that all the course mid-term and final examinations are currently internally moderated by a designated faculty member who reviews the assessed work of every student using model answers provided by course coordinators. There are expectations that all assessments will be internally moderated in the future. However, the Panel noted that the internal moderators' feedback on assessments tend to be very supportive of the instructors'

work. Despite the fact that there is provision for internal moderation in ASU's policies and procedures, and this is actually implemented, the internal moderation process has failed to catch several serious shortcomings that greatly affect the quality of the contents and assessments of courses. Numerous are the cases encountered by the Panel during the scrutiny of the course portfolios where the internal examiner did not play his/her role in such a way as to ensure the effectiveness of the quality of the course contents and assessments. The Panel recommends that the College should develop a mechanism to monitor the implementation of the internal moderation system and evaluate its effectiveness.

3.6   According to ASU Internal and External Moderation Policies and Procedures Manual, all course final examinations are expected to be sent to the external examiner at the latest two weeks before the examination of each course and the external examiner is to send his/her comments about the examination questions at the latest two days before the examination. As of this year, all final examinations are externally moderated before the examination and the feedback is considered by faculty members who may agree with the External Examiner, in which case they implement the modifications, or they disagree and then have to present justifications for their stance to the programme coordinator. The External Examiner's feedback is also taken into account in the annual programme review. Nevertheless, the Panel did not find any evidence of external moderation of students' assessed work, contrary to what ASU's policies require. The Internal and External Moderation Policies and Procedures Manual also lists several procedures related to the selection of the external examiners by each department council, but so far external examiners are selected through an MOU with Al-Yarmouk University in Jordan. They vary according to the course to be moderated and based on their own areas of expertise. Although external examiners' feedback have seriously been taken into account and course contents and/or assessments improved as indicated during the site visit meetings with senior managers, faculty members and one External Examiner, the Panel noted a number of cases of partial coverage of course contents, and inappropriate assessment questions. In some cases, there was no evidence of external examiner's feedback. For instances, there are no external moderation forms for CS121 (Discrete Mathematics) and CS214 (Data Structures and Algorithms), and in CS111(Structured Programming), the problems are fairly uniform, not varied enough, and close to what are given in assignments and quizzes/mid-terms, which are not seen by the external examiners. The Panel recommends that the College should implement all ASU's external moderation policies and procedures, especially those related to the selection of external examiners, and ensure effective external moderation of all graded work.

3.7   During the site visit, the Panel had an ample opportunity to scrutinise the course portfolios which were all made available, including the students' assessed work. Based on this, the Panel has come to the conclusion that the assessments in the BCS programme fail to meet the expected standards. The assessments tend to be much easier than expected and in a number of cases; there is evidence of inflated grades and

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even incorrect assessment feedback. In the Artificial Intelligence course, for instance, in Assignment1 of 2015-2016, one student got 8/10 at Exercise1 while her answers have nothing to do whatsoever with First Order Logic and show that she is completely "out". Another got 7/10 at Exercise5 while she did not at all understand what propositional statements are and the answers make absolutely no sense. At Exercise7, the same student got 20/20 while five answers out of 11 are incorrect. The examination questions in a number of courses also seldom go deeper into challenging levels of critical thinking and innovation. Furthermore, as mentioned in paragraph 3.6, in several courses, some important topics are not included in the course specification, some listed topics in the weekly schedule are not assessed, and the assessments are not at the expected level. For example, in CS311 (Design and Analysis of Algorithms), one of the questions in the final examination asked students to write the adjacency matrix and list representations of a specific graph. Since graphs are on the syllabus for the pre-requisite data structures course and adjacency matrices and lists are on the weekly schedule for the Level1 course Discrete Mathematics, such a question is not appropriate for CS311. The assessment is generally at too low level for an undergraduate course on algorithms. There is also no evidence that topics such as depth- and breadth- first search, binary tree traversal, topological sorting, quicksort, binary tree traversal, balanced search tree, heaps, heap sort, and greedy algorithms that are listed in the weekly schedule were actually assessed in this presentation of the course. All this brings the Panel to the conclusion that the level of student's achievement is not suitable for the type and level of the programme. The Panel recommends that the College should develop and implement mechanisms to ensure the level of student's achievement is appropriate for the programme type and level.

3.8   The sample course evaluation report, mean GPAs, and survey of employers and alumni indicate that ASU BCS graduates meet programme aims and intended learning outcomes. During the site visit, the programme alumni and students the Panel met with expressed great satisfaction with the programme. However, the alumni wished they had acquired more practical skills that are needed in the job market such as Oracle, which is very demanded in Bahrain as the alumni said. Problem solving skills were also mentioned as needing improvement. The Panel requested to meet programme graduate employers, however the programme team managed to provide a meeting with one employer only. The members of the advisory board the Panel met with said that the programme gives the major skills to the students just like other local programmes do, adding that the students need some real experience in industry, i.e. more practical training. The Panel was also informed that ASU has increased practical content in the study plan of 2015-2016. So far, the CS department bases its study of the quality of the graduates on surveys of employers and of alumni, although these remain few in number, especially that a number of graduates have not managed to get jobs because of the weak job market as explained to the Panel during the site visit. It also conducts an annual survey report 2014-2015, which includes Graduating Students' survey analysis. As to the graduation project, the SER states that 'the student graduation project provides an important opportunity for the achievement of

programme objectives and the attainment of ILOs as it is a comprehensive capstone course'. Nevertheless, based on its scrutiny of the course portfolio, the Panel has noted that although plagiarism is a topic for week 1, there is evidence of plagiarism in the graduation project reports. Indeed, all of the graduation project reports made available to the Panel contain plagiarized content. With the above in mind, the Panel believes that the graduates do not meet the programme aims and ILOs. The Panel recommends that the College should ensure the academic standards of graduates and that student work including graduation projects is free of plagiarized content.

3.9   ASU conducts cohort analysis yearly. The latest indicates that seven of the 13 students admitted in 2011-2012 have graduated and another two are still registered. Table 3.4 of the SER indicates an attrition rate of between 11% and 29%. These numbers were confirmed during the site visit. The mean time to graduation was 8.66 semesters for those graduating in 2012-2013, then 9.75 for 2013-2014, and then down to 8.42 for 2014-2015. Nine Bahraini students graduated up to 2014-2015. Of these, four were employed. The Panel believes the ratios of admitted students to successful graduates including rates of progression, retention, year-on-year progression, and length of study are acceptable. However, there is some worry that the ratio of students not finding a job remains rather high, especially given the high demand in the region for computer specialists as confirmed by the advisory board member the Panel met with during the site visit. The Panel encourages the CS Department to do a more thorough analysis of these parameters and compares them locally and regionally.

3.10   There is a policy and there are procedures to manage and assess BCS programme internships. The BCS programme requires the completion of a three-credit internship before graduation. The student writes up a report at the end of the internship, which is 'an important component of the overall evaluation' as stated in the SER. The student is evaluated by the organisation providing the internship, the Academic Training Supervisor, and the Head of Training and Internship Unit. The student is evaluated for a number of components of the training, including the report he/she submits and the presentation he/she gives in front of the Head of Training and Internship Unit and the Training Supervisor. Based on a scrutiny of the course CS433 portfolio, the Panel notes some discrepancies with respect to the implementation. For instance, whereas the teaching is in English and the students are supposed to submit a written report, which has a substantial part of the overall evaluation, out of the six students whose files were in the course portfolio, two submitted a report in Arabic, and one submitted a report in English, which contained plagiarized paragraphs with no references given whatsoever. This gives the impression that the internship is not taken very seriously. The Panel recommends that the College should ensure the implementation of ASU policy and procedures related to the assessment of internships and ensure that the student work meet the course level and stated ILOs.

3.11   There is a BCS programme capstone project, CS432 Graduation Project, at ASU with a report writing up. The course is mandatory for each student before he/she can graduate. A faculty member supervises each project and monitors the progression of

the student work on a weekly basis. The Undergraduate Dissertation Policy clearly defines the responsibilities and the duties of the supervisor and the student. The assessment criteria and procedures are also well defined and known to students. It comprises 55% for the report, 25% for the CS artifact and 20% for the presentation. Furthermore, the graduation project is assessed by four internal assessors and an external examiner and the CS department forces the students to submit all their final year reports through the Turnitin plagiarism detection system. Nevertheless, all of the graduation project reports made available to the Panel contain plagiarized content, as noted in paragraph 3.8. This should be an alarming statement for the people in charge in the department, the College, and the University at large.

3.12   An advisory board policy is in place at ASU. As a consequence, an advisory board that contributes to the development of the programme exists in the CS Department. It is composed of 12 members, three of which are senior members from the economic sector, one academic from the UK, one CS graduate, and the remaining are from ASU. The Panel is of the view that the Advisory Board includes too many members from ASU. Contrary to what is stated in the SER that 'the CS programme has an advisory board that meets at least once each semester', the minutes the Panel has seen point to almost an average of a meeting per year. Nonetheless, there is evidence that past suggestions by the Advisory Board of programme revisions have been taken into account and integrated into a programme revision, as confirmed during the meeting with the advisory board member. This was the case for the suggestion of the inclusion of two courses, one on Mobile Computing and one on Web Technologies. An additional suggestion about an employment ecosystem has been made by the Advisory Board but is awaiting feedback from the university administration. The Panel appreciates that there is a functioning advisory board that contributes to the development of the programme.

3.13   ASU's QA manual highlights the importance of monitoring the satisfaction of stakeholders to evaluate whether their needs and requirements have been met. As such, employer and alumni surveys are provided. An annual survey report is also collected which includes Graduating students survey analysis. All the results are analysed and fed into a Programme Evaluation Document, which is discussed at different levels of the QA chain at ASU. A survey of a number of graduates shows that they are overall satisfied with the education they received at ASU. This has been confirmed to the Panel during the site visit; the alumni they met with were satisfied with their studies at ASU. Nonetheless, the samples of surveys the Panel has been able to see show that the CS department still has problems keeping in touch with all its alumni and getting more feedback from their employers. The recently started Council of Alumni should be a good step towards strengthening the currently weak ties. The Panel encourages the College to strengthen its ties with the alumni and their employers.

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

- Graduate attributes are well defined at the institutional level and translated into BCS programme aims to which PILOs are mapped.
- There is a functioning advisory board that contributes to the development of the programme.

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

- revise the methodology employed to determine the achievement of the programme intended learning outcomes
- fully implement ASU benchmarking policy and expand the benchmarking activities to include admission criteria, learning resources, the achievement of students and the standards of assessment
- develop a strict policy with respect to plagiarism and apply it to all student work, not just final year graduation projects
- reconsider the methodology employed to determine the achievement of the course intended learning outcomes and ensure that programme and course intended learning outcomes are systematically and exhaustively assessed
- develop a mechanism to monitor the implementation of the internal moderation system and evaluate its effectiveness
- implement all ASU's external moderation policies and procedures, especially those related to the selection of external examiners, and ensure effective external moderation of all graded work
- develop and implement mechanisms to ensure the level of student's achievement is appropriate for the programme type and level
- ensure the academic standards of graduates and that student work including graduation projects is free of plagiarized content
- implement ASU policy and procedures related to the assessment of internships and ensure that the student work meet the course level and stated ILOs.

3.16   **Judgement**

On balance, the Panel concludes that the programme **does not satisfy** the Indicator on **Academic Standards of the Graduates.**

4.   Indicator 4: Effectiveness of Quality Management and Assurance

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

4.1   ASU has several policies and procedures related to programme management and delivery such as Learning, Teaching and Assessment Strategy, Assessment and Feedback Policy, Policy for Development and Review Policies and Procedures, Programme and Course Coordinators Responsibilities and the QA Manual. The latter provides an evidence of the QA management process that ensures the effectiveness of each policy. The interviews with the QAAC staff and the administrative and academic staff confirm the existence of policies and procedures providing the support for maintaining academic standards and operation of the programmes. The Panel was also informed during the site visit meeting with QAAC members that QAAC assumed the lead role for monitoring the implementation of these policies and procedures across all academic programmes, twelve months ago. From the submitted documents and interviews with administrative, academic, and QA staff, the Panel concludes that ASU implements its policies fairly and with the participation of all appropriate stakeholders. The policies related to students and staff are available on 'Moodle'. The interviewed students also confirmed their awareness in terms of the availability and the regular implementation of these policies. The Panel appreciates the presence of general policies and procedures appropriate to the management of the programme that is fairly implemented with the participation of relevant stakeholders.

4.2   The structure of management for the BCS programme is starting from the institutional level to the course coordinator level passing by the Dean, the HoD and the programme coordinator. ASU's Responsibility, Accountability, Consulted, Informed (RACI) document lists the responsibilities of faculty, department heads, and college deans, etc. RACI matrix clearly defines all responsibilities/accountabilities across the entire university and at all levels including the QAAC and QAUs. During interviews, the Panel learnt that the Dean is getting the support of the Vice- Dean and the programme coordinator to monitor and ensure the proper delivery of the BCS programme. The College has gone through recent appointment of its management team who are currently supported by the senior academic and administrative staff to maintain academic standards and oversee the development and implementation of academic strategic planning. The Department Council, College Council and standing committees are also responsible for academic decisions related to the BCS programme. Overall, the Panel is of the view that the programme management in terms of demonstrating effective and responsible leadership is satisfactory.

4.3   ASU's Quality Assurance Manual describes ASU's QA management system as well as procedures for the preparation of documents such as SERs needed for external QA of programmes. The QAAC is responsible for monitoring the QA management system at

ASU. The interviews referred to the existence of a clear organizational chart where the QAAC reports to the Quality Assurance Council of the University. QAAC is regularly coordinating with the College and the programme team *via* the college's QA Director. During the interviews with the QAAC staff and the administrative and academic staff, the Panel was informed that the QAAC manages and monitors the implementation of all policies and procedures and that the college's QA Director is responsible for maintaining the standards of the QA across the College. The QA Director chairs the college's QAU and plays a fundamental role in monitoring and evaluating the implementation of all the policies relevant to the programme management and delivery. The interviews also confirmed the involvement of the academic and administrative staff in the quality assurance processes at both institutional and programme level and the previous reviews of other programmes at ASU played additionally a vital role in the assessment of the QA system. However, as discussed under Indicator 3 of this Report, the Panel is concerned about the assessment in a number of courses and recommends that the College should ensure that the QAU better monitors and evaluates the effectiveness of the implementation of the policies and procedures relevant to assessments of students work.

4.4   ASU faculty have access to several documents, including the QA manual from which they can acquire the required understanding of quality assurance and their role in ensuring effectiveness of provision. The SER asserts that 'implementing Quality Assurance policies and procedures have become a daily activity for all department academic staff'. During the various site visit interviews, senior and junior staff the Panel met were very much aware of the internal QA system and involved, to some degree, in quality assuring their day-to-day duties. In the CS Department, five faculty members have administrative duties, which make them directly involved in ensuring various QA aspects. Moreover, a number of workshops and trainings have been conducted on QA during the academic years 2014-2015 and 2015-2016 which was attended by a large number of faculty members. This was also confirmed during interviews of QAAC staff and other faculty. Overall, the Panel acknowledges that the academic and administrative staff have a good understanding of QA and their role in the entire chain of QA at ASU.

4.5   ASU has a 'New Programme-Development Policy and Procedures' that has recently been introduced in the Academic Year 2015-2016. This policy and procedures define the 'Initial Approval Process' and the 'Validation Event' of new programmes with detailed flow charts and explain the responsibilities of the various parties responsible for the inception and validation of these programmes. The SER also describes the procedure to develop and update a programme, which is suitable for updating an existing programme. During meetings with QA staff and faculty members, the Panel was informed that the policy and procedures for the development of new programmes are going to be implemented starting September 2016 and that the University is now moving to a period where all new programmes will be designed so as to be consistent with the NQF requirements. The Panel acknowledges that the recently developed

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policy and procedures stipulate the main requirements for developing and approving new programmes.

4.6   Policies and procedures are in place for the annual internal programme evaluations and improvements as shown in the 'Monitoring and Review of Programmes 2015–2016 Policy and Procedures' and ASU's QA manual. In the latter document, among other reviews, the yearly review, which is conducted by each programme team, is meant to provide a self-critical review of the programme and its operation over the previous academic year. It should take into account various quantitative and qualitative indicators and eventually produce a review report (the Programme Evaluation Document) with action plans for improvement. This must, in turn, be discussed at various levels (College and QAAC) before being validated and sent back to the Department for implementation. The SER also asserts that the BCS programme is evaluated internally at the end of each academic year. This has been confirmed during the site visit and there are evidence of implementation of recommendations for improvement in the revised curricula of 2013-2014 and 2015-2016, and minutes of various committee meetings in the approval process for the 2013-2014 curriculum. The Panel appreciates that the programme is annually evaluated internally and there are action plans for improvement that have been implemented and encourages the College to expand its mechanism to include the programme's output.

4.7   The periodic review policy adopted by the BCS programme employs internal and external sources such as student feedback, alumni reviews, employers, advisory board input, and assessment from external reviewers from universities the programme is collaborating with. The periodic review includes feedback from the internal sources for the evaluation of the learning outcomes for both theoretical and practical courses in addition to reports of the academic advisors, notes of the internal reviewer, course evaluation report and internship. There is also evidence of frequent external review using reviewers from several regional and international universities. During interviews, the programme team confirmed that benchmarking with other comparable programmes, stakeholders surveys and both internal and external feedback led to major improvements in the BCS curriculum which has evolved from a 2012-2013 curriculum to the 2015-2016 one. They also confirmed that the programme review policy, which is included in the QA manual, was followed in the 2012-2013 programme review as stated in SER. In general, the Panel appreciates that there is a policy for five-year major evaluations of the programmes involving internal and external entities, which is followed during major revisions of the programme.

4.8   Structured comments are collected regularly from the students, advisory board and other stakeholders through surveys and meetings. At the end of every semester, the collected comments are assembled into statistical reports and discussed in the Department Council. There are mechanisms in place for the implementation of the recommendations of improvement at the course level. The course evaluations are also considered as an indication for the graduates' satisfaction of the quality of the

programme. The content of the provided evidence proves the satisfaction of the students, alumni, the advisory board, and other stakeholders with regards to the improvements made at the programme level. This has been confirmed during the interviews the Panel had with these groups. Nonetheless, there are no sufficient evidence supporting the fact that all the collected feedback is actually made use of and that the outcomes are communicated to stockholders. Furthermore, the provided employers' survey and employer survey analysis shows the feed-backs from employers collected on 1/12/2015 and 22/3/2016 about four ASU BCS graduates. The feedback was positive, though the employers highlighted the need to improve the graduates' English level and problem solving skills. The (undated) written reply by the programme team sounded a little self-satisfied and did not mention any further scrutiny to be launched or action to be taken. The Panel recommends that the College should ensure that the structured comments of all relevant stakeholders are gathered, analysed and used to improve the BCS programme and that the outcomes are communicated to the stakeholders on a regular basis.

4.9   ASU has established the Academic Staff Development Centre in 2010-2011. The Centre manages staff development and produces a development programme at the start of each academic year. The professional development needs of staff are identified during annual department council meetings and during the annual performance appraisal of staff. The Dean assesses and approves these needs prior to the submission to the academic staff unit for inclusion in the university annual training plan. The seminars, workshops and training courses provided by the Centre are the main means used to manage staff development and are assessed by participants. A large number of workshops and trainings have been run during the academic years 2014-2015 and 2015-2016 on QA and other topics. Moreover, five CS faculty are presently participating in a training programme being run with the Higher Education Academy of the United Kingdom on academic practice. Development opportunities also include support for publication, attending seminars and conferences. In meetings with the academic staff, the Panel learnt of their satisfaction with the seminars and workshops provided for their self-development as well as their satisfaction regarding the support provided by the University for scientific publication by covering all the costs and registration fees for attending and participating in conferences. The Panel appreciates that there is an annual professional development plan that is implemented and that the University provides support to academic staff to meet their individual professional development needs.

4.10   The SER lists five mechanisms that ASU uses to ensure that the objectives and aims of the BCS programme are aligned with the market needs. These consist in surveys of the employers (of ASU CS graduates), alumni survey, feedback from the CS advisory board, feed-back from the external examiners and reviewers, and the annual benchmarking of the programme with local, regional, and international universities and CS reference points (ACM/IEEE, etc.). The SER also mentions that the University considers the reports produced by Tamkeen and regularly commissions consulting

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agencies to provide analyses of the market needs in Bahrain. It turns out, however, that the 'Sectoral and Skills Gaps Analysis' report mentioned to the Panel during the site visit was carried out by the Allen Group for Tamkeen, Bahrain, in June 2009 and its findings are obsolete by now. As to the 'Gulf Talent 2016' mentioned during the site visit, it is too general a study about broad economic indicators of the region, which does not contain any relevant information that could help the CS Department to evaluate if its programme is up to date and needed by the market. The Panel is yet to see evidence of relevant, recent labour market studies that the CS Department at ASU takes into account as input to assess how far the BCS programme meets the local and regional market needs. Furthermore, the Panel notes in passing through the data given in the SER and Graduate Employment Report about BCS graduates that the number of those employed are not consistent. The latter report states that out of 12 students who graduated since 2011, three are unemployed, two work in ICT, and the rest are employed in non-ICT areas. This means that about 17% of graduates only work in ICT, which raises some concern. Moreover, the available data indicates that the number of unemployed graduates is quite high and this was confirmed by the alumni during the site visit, despite the low cohort numbers. In the last four academic years the number of students admitted to the programme varies between eight and 18 as indicated in paragraph 2.2. Therefore, while the Panel acknowledges the various mechanism ASU uses to ensure that objectives and aims of the BCS programme are aligned with the market requirements, it recommends that the College should further investigate the market needs in relation to the current high number of unemployed graduates and low cohort numbers.

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

- The presence of general policies and procedures appropriate to the management of the programme that is fairly implemented with the participation of relevant stakeholders.
- The programme is annually evaluated internally and there are actions plans for improvement that have been implemented.
- There is a policy for five-year major evaluations involving internal and external entities which is followed during major revisions of the programme.
- There is an annual professional development plan that is implemented and the University provides support to academic staff to meet their individual professional development needs.

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

- ensure that the QAU better monitors and evaluates the effectiveness of the implementation of the policies and procedures relevant to assessments of students work
- ensure that the structured comments of all relevant stakeholders are gathered, analysed and used to improve the BCS programme and that the outcomes are communicated to the stakeholders on a regular basis

- further investigate the market needs in relation to the current high number of unemployed graduates and low cohort numbers.

4.13 Judgement

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

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5. Conclusion

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

There is limited confidence in the Bachelor in Computer Science of College of Arts and Science offered by the Applied Science University.

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