

BSc. (Honours)
Information Technology and Computing
Programme Specification

AOU / OU-UK

(Revised September 2017)



Arab Open University Faculty of Computer Studies

BSc (Honours) Information Technology and Computing

September, 2017

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Programme specification

1. Overview/ factual information

Programme/award title(s)	BSc (Honours) Information Technology and Computing BSc (Honours) Information Technology and Computing/ Computing with Business BSc (Honours) Information Technology and Computing/ Computer Science BSc (Honours) Information Technology and Computing/ Networking & Security BSc (Honours) Information Technology and Computing/ Web Development
Teaching Institution	Arab Open University (AOU)
Awarding Institution	The Open University (OU), UK
Date of latest OU validation	29 April 2017
Next revalidation	September 2022
Credit points for the award	360 points
UCAS Code	Not applicable
Programme start date	September 2017
Underpinning QAA subject benchmark(s)	QAA subject benchmarks for computing 2016
Other external and internal reference points used to inform programme outcomes	External : 1. QAA's Subject Bench Mark: Computing, February 2016 2. Computer Science Curricula Guidelines 2013, ACM-IEEE Computer Society 3. OU, UK Website : www.open.ac.uk 4. Most in demand skills in 2017 https://www.facebook.com/worldeconomicforum/videos/10153882884451479/

	<p>5. Skills that can get you hired in 2017 http://uk.businessinsider.com/skills-that-can-get-you-hired-2016-10?utm_source=feedly&utm_medium=webfeeds?r=US&IR=T</p> <p>6. The Future of jobs report by World Economic Forum, January 2016 http://www3.weforum.org/docs/WEF_Future_of_Jobs.pdf</p> <p>7. Annual Report, 2015-2016, World Economic Forum. http://www3.weforum.org/docs/WEF_Annual_Report_2015-2016.pdf</p> <p>Internal :</p> <p>1. ITC Revalidation Documents-April 2012.</p> <p>2. ITC-External Examiners' reports and discussions, Arab Open University.</p> <p>3. Learning and Teaching Strategy, Arab Open University. https://www.arabou.edu.kw/images/reg/final_learning_strategy.pdf</p> <p>4. Study carried out by Dr Abbas Abdel Karim : Internal study on “Relevance of AOU Graduates and Programmes to Labour Market Needs”</p> <p>5. Hussein, A.S., and Khan, H.A., “Student Performance Tracking in Distributed Open Education using Big Data Analytics,” to be presented in the Second International Conference on Internet of Things, Data& Cloud Computing (ICC 2017), University of Cambridge, UK, 22-23 March,2017</p>
Professional/statutory recognition	Recognised by Ministries of Higher Education in KSA, Kuwait, Lebanon, Egypt, Oman, Jordan, Bahrain, Sudan, and validated by the Centre for Inclusion and Collaborative Partnerships (CICP),OU, UK.
Duration of the programme for each mode of study (P/T, FT,DL)	8 Years
Dual accreditation (if applicable)	N/A
Date of production/revision of this specification	September, 2017

List of Abbreviations:

AOU	Arab Open University
HQ	Head Quarter
FCS	Faculty of Computer Studies
ITC	Information Technology and Computing
BEC	Branch Examination Committee
CAC	Course Assessment Committee
FEC	Faculty Examination Committee
CEC	Central Examination Committee
BCC	Branch Course (module) Coordinator
GPC	General Programme Co-ordinator
EE	External Examiner
CEE	Chief External Examiner
VPAA	Vice President for Academic Affairs
QAAD	Quality Assurance and Accreditation Department
ARED	Admission, Registration and Examinations Dept.
GCC	General Course (module) Coordinator
PC	Programme Coordinator
CBM	Cross Branch Marking
PDP	Personal Development Plan

Please note: This specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided.

More detailed information on the learning outcomes, content, teaching and learning and assessment methods of each module can be found in student module guide(s) and the students' handbook.

The accuracy of the information contained in this document is reviewed by the University and may be verified by the Quality Assurance Agency for Higher Education.

2. Programme aims and objectives

2.1 Educational aims and objectives

2.1.1 Educational aims and objectives of the Information Technology and Computing (ITC) programme

The Information Technology and Computing (ITC) programme has been designed and developed to provide a high quality programme of study to students at the Faculty of Computer Studies (FCS), Arab Open University (AOU). The design and development of this programme have taken into consideration the guidelines provided by professional standard bodies, including the QAA, UK (QAA2016) and the curriculum guidelines of ACM-IEEE 2013 in addition to the up-to-date prospectus of the Computing and Information Technology provided by the Open University-UK. Hence, this programme will enable the students at FCS, AOU to fulfil the standards expected of the ITC graduates. The flexibly structured ITC programme has the following overall aims:

- To provide students with a sound grasp of essential principles of hardware based, software based or systems based technologies.
- To provide students familiarity with a variety of modern programming languages and the underlying principles of programming paradigms- functional, object oriented, logical etc.
- To enable students to solve scientific problems, along with appreciation for mathematical and scientific methods which will provide lifelong support to their carrier.
- To enable students to apply their knowledge and skills in a broad range of ITC related industries and organisations.

- To prepare students for employment in a wide range of firms, including communication systems, software engineering, networking and Security or web technologies.
- To enhance students' experience in communication, time management, analysis and problem solving.
- To develop students' skills for working in a team to tackle an appropriate development task and accomplish projects to demonstrate their ability to undertake a substantial piece of work.

2.1.2 Educational aims and objectives of the Information Technology and Computing (ITC) Pathway

This flexibly structured pathway has the following overall aims:

- To provide students with up to date principles and concepts of system based technologies, including hardware and/or software based systems.
- To enable students to apply their knowledge and understanding appropriately in activities such as analysis, abstraction, problem-solving, design, development and testing in a wide range of industries and organisations.
- To prepare students for employment in the field of ITC, including developing, integrating, and/or maintaining software and/or hardware based systems.
- To equip students with appropriate cognitive, key, practical and professional skills, including the skills needed to undertake lifelong learning in their chosen professional field.
- To enhance students' experience in communication, time management, analysis and problem solving related to ITC systems.
- To develop students' skills for working in a team to tackle an appropriate development task and accomplish projects to demonstrate their ability to undertake a substantial piece of work.

2.1.3 Educational aims and objectives of the Computer Science (CS) Pathway

Professionals working in the software industry at large bring many different kinds of expertise to their work environment. The aim of the Computer Science (CS) Pathway is to equip the student with the knowledge and skills he/she will need to take part in software related industry.

In particular, our aim is to give the student:

- A grasp of computer science and of modern computer systems.
- Strong skills in software engineering, strategy and project management in addition to multimedia technologies.
- The ability to understand and work in software systems that are now being constructed and used, including distributed Internet systems, intelligent systems and databases.
- Essential skills required for software development and maintenance, such as analysis, design, programming and evaluation are built and maintained.
- A familiarity with a variety of modern programming languages and the underlying principles of Programming paradigms-functional, object oriented, logical, etc.
- An ability to solve scientific problems, along with appreciation for mathematical and scientific methods which will provide lifelong support to their carrier.
- An ability to work with other people in a team, communicating computing ideas effectively in a verbal and written manner.
- The qualities that come with being a graduate such as: specialist knowledge, intellectual self-confidence and independence, analytical ability and the life-long learning skills needed to keep up with fast-changing technologies.

2.1.4 Educational aims and objectives of the Web Development (WD) Pathway

This modern pathway has the following overall aims:

- To provide students with a wide umbrella of up-to-date knowledge and understanding of Web based solutions, Internet of things and Cloud Computing.
- Prepare students to integrate the principles, concepts and techniques associated with web application/solutions, including the analysis, design and development processes involved.
- To provide the students with the necessary tools and methodologies, to construct, design and implement up-to-date web solutions; to enable them to carry out a project in web development that applies and extends their knowledge and understanding.
- To provide the students with the skills to be able to use the latest programming, networking and human-computer interaction methods for designing and developing advanced web applications.
- To provide students with the required skills that enable them to consider and understand the potentials and limitations of web based systems.

- To enable the students to work with other people in a team, communicating ideas effectively in a verbal and written manner.
- To provide the student with the qualities that come with being a graduate such as: specialist knowledge, intellectual self-confidence and independence, analytical ability and the life-long learning skills needed to keep up with fast-changing technologies.

2.1.5 Educational aims and objectives of the Networking and Security (N&S) Pathway

Networking and Security are disciplines that are closely intertwined and that undergo fast technological advances. The N&S Pathway aims to prepare the students for a professional career in these areas. It has the following overall aims:

- To enable students to develop knowledge and understanding of the fundamental concepts and technologies related to Networking and Security.
- To prepare students to apply, creatively and responsibly, their knowledge and understanding of networking systems and security techniques in activities such as: the critical analysis of these systems; effective planning, administration, and management of such systems; the proposal and planning of enhancements to these systems; the objective evaluation of the use of such systems.
- To enable students to make reasoned arguments concerning the wide range of issues and challenges faced by networking and security systems.
- To prepare students for professional work in the fields of networking and security by providing them with the skills and capabilities needed to undertake lifelong learning and to keep their knowledge and understanding up to date.
- To enable the student to work with other people in a team, communicating ideas effectively in a verbal and written manner.
- To prepare students to not only be employed as Network related specialist, but also a Security specialist such as, Cyber Security Analysts, etc.
- To provide the student with the qualities that come with being a graduate such as: specialist knowledge, intellectual self-confidence and independence, analytical ability and the life-long learning skills needed to keep up with fast-changing technologies.

2.1.6 Educational aims and objectives of the Computing with Business (CwB) Pathway

Computing and Business are disciplines that have become closely intertwined through the world of work. The aim of the Computing and Business pathway is to equip the student with the knowledge and skills the student will need to take part in the management and execution of computer-related projects in a business setting. In particular, it has the following overall aims:

- To provide the students a grasp of the key concepts of computing and of modern computer systems, especially in Business context.
- To provide the students an acquaintance with all facets of the world of business: markets, organizations, processes, strategies, policies and decision-making, etc., along with the role of ITC.
- To prepare the students to understand the types of software systems that are now being constructed and used in business and management fields such as, e-commerce systems, Management Information systems, ERP solutions, Human Capital Management, data analytics, etc.
- To provide students with essential skills required for software development and maintenance, such as analysis, design, programming and evaluation are built and maintained.
- To prepare the students to develop key business skills of communication, presentation and team working.
- To enable students to acquire the qualities that come with being a graduate: specialist knowledge, intellectual self-confidence and independence, analytical ability and the life-long learning skills needed to keep up with fast-changing technologies.

2.2 Relationship to other programmes and awards

(Where the award is part of a hierarchy of awards/programmes, this section describes the articulation between them, opportunities for progression upon completion of the programme, and arrangements for bridging modules or induction)

To obtain the BSc. Honours degree students must achieve 360 credit points.

Opportunities to transfer between ITC Programme Pathways

A Transition Plan has been prepared to enable students registered in the current ITC Programme pathways to transition smoothly to the updated pathways after revalidation. Proper academic advising will be provided to such students to help them to achieve smooth transition into updated pathways.

Employment Opportunities

Information Technology and Computing skills have become fundamental to the way we live, work, socialize and play. This degree opens up the world of technology and an array of exciting careers in a wide range of sectors – from systems and software industry, finance, government, health, education and the ‘third sector’, to business, gaming, and commerce.

It will help the student to become a dominant player in the field of Computing and Information Technologies; to analyse, develop, test, maintain, integrate and use hardware and/or software or hybrid systems; to participate in innovating new solutions to meet specific market or organisation needs. A choice of pathways through the degree will enable the students to concentrate their studies on Information Technologies and Computing, Computer Science, Web Development, Networking & Security or Computing with Business.

The ITC skills are in great demand in the Middle Eastern region, since it is a developing and emerging region, which requires to build its IT. Also, there is a growing trend and awareness amongst the countries of the Middle Eastern region in which AOU operates, to either shift away from oil dependency or explore alternative avenues to create jobs for young generation of the future. At the forefront of this trend is the focus on developing the “Knowledge Economy”, which will require highly skilled ITC graduates. Hence, the graduates of our ITC programme are expected to find employment opportunities both at their local developing sector as well as in the international market.

Some of the key areas in which our graduates can find employment opportunities include the following:

- System modeling, analysis, development and integration, including hardware, software and web based systems.
- Software Industry
- Network design, development and maintenance
- Network and Cyber Security
- Storage Management
- Big Data analytics
- Mobile Technology
- Web Development, Internet of Things, Cloud Technologies
- Health informatics
- Financial sector including banking
- Management Informatics
- Digital Advertising and Media Sector

3. Programme outcomes

The subject benchmark statements provided by the QAA, UK (QAA 2016) have been taken into account in the preparation of the Learning Outcomes of the ITC programme pathways. These include the skill sets that the graduates of computing are expected to possess. The associated teaching, learning and assessment methodologies have also been provided below in the learning outcomes of each pathway. The intended learning outcomes for all five pathways of the ITC Programme are listed below.

3.1 Learning Outcomes of Information Technology and Computing (ITC) Pathway

The ITC pathway provides opportunities for students to develop and demonstrate knowledge and understanding, qualities, skills and other attributes in the following areas:

A. Knowledge and understanding of:

Students graduating from the ITC pathway should demonstrate:

1. The ability to describe and evaluate the principles, concepts and techniques associated with the technology of computers and digital communication systems, at both the individual component and the system level, including use of appropriate models.
2. The ability to recognise the broad range of contexts in which computers and digital communication systems are used and of the various ways in which users interact with them.
3. The ability to describe the major trends and issues in Information Technology and Computing.
4. The ability to integrate professionally the lifecycle of computing and IT systems, including the integration of theory and practice to develop specifications, designs, and implementations to solve novel problems.

B. Cognitive skills

Students graduating from the ITC pathway should be able to:

1. Explain the differentiation between IT and Computing systems, including hardware based, software based or system based contexts.

2. Illustrate the sound grasp of principles of ITC technologies for abstracting, modelling, problem-solving, designing and testing in the fields of Information Technology and Computing, being aware of the limitations involved.
3. Distinguish the features and specifications of hardware based, software based IT and Computing systems.
4. Extend the knowledge about ITC systems to carry out a small project in Information Technology and/or Computing at the module level (as part of the TMA) that applies their knowledge and understanding; critically reflecting on the processes involved and the outcomes of their work.

C. Practical and/or professional skills

Students graduating from the ITC pathway should be able to:

1. Specify, design, develop, deploy and manage small computing and IT projects.
2. Investigate, compare, clarify and select IT and computing systems, according to particular demand.
3. Plan and organize themselves and their work appropriately; keep systematic records of work in progress and outcomes.
4. Deal with issues such as risk and complexity, including the ability to perform trouble shooting in unstructured environments.

D. Key skills

Students graduating from the ITC pathway should be able to:

1. Demonstrate the ability to work independently and as part of a team, gathering and evaluating different types of information, identifying problems, developing and documenting solutions, and making effective use of ICT for project management, communication and collaboration.
2. Communicate and report professionally and effectively in an Information Technology and Computing context.
3. Apply problem-solving skills in an Information Technology and Computing context.
4. Critically analyse and use data and information effectively in Information Technology and Computing context.
5. Exhibit proficiency in using the appropriate numerical and mathematical skills.
6. Conduct own self learning to the extent that they are prepared for lifelong learning after graduating.

3.2 Learning Outcomes of Computer Science (CS) Pathway

The Computer Science pathway provides opportunities for students to develop and demonstrate knowledge and understanding, qualities, skills and other attributes in the following areas:

A. Knowledge and understanding of:

Students graduating from the CS pathway should be able to:

1. Describe and effectively use the key concepts of computer science.
2. Judiciously select the methods and tools used to develop software solutions.
3. Demonstrate a good grasp of the key concepts of software development, integration and maintenance, including principles of requirements analysis, design and programming.
4. Describe the different approaches and methods/techniques of representing, visualizing and extracting information from data, including from the large data sets (Big Data).
5. Integrate the key concepts related to Computer Science, including algorithms, data structures, computability, object oriented programming languages, Software Engineering, development and testing of software systems.
6. Adopt novel solutions in a range of situations in which computer science can be applied, the ways in which people interact with computer science solutions, and the ethical, social and legal problems that computer science can create and solve.

B. Cognitive skills

Students graduating from the CS pathway should be able to:

1. Interpret and analyse problems, and design & evaluate novel solutions to them.
2. Explain key software development concepts and apply them to practical problems.
3. Distinguish between a variety of software design and development methods, tools and testing methodologies.
4. Compare and contrast a variety of software development methods and tools, identifying the best choices to apply to specific problems.
5. Distinguish and appreciate the various roles, functions and interactions of members of a software “solution” development team.
6. Demonstrate the ability of becoming a computational thinker and to provide efficient computing solutions.

C. Practical and/or professional skills

Students graduating from the CS pathway should be able to:

1. Plan, design, develop, test and evaluates computer science applications.
2. Deploy modern software tools for construction of computer science solutions and applications to solve practical problems.
3. Test and critically evaluate different software solutions.
4. Participate in multidisciplinary projects, wherever Computer Science plays a dominant role in such projects.
5. Consider and handle the ethical, social and legal issues that may arise during software development and use.

D. Key skills

Students graduating from the CS pathway should be able to:

1. Organise their work independently, planning, monitoring, reflecting on and improving your own learning.
2. Categorise work in a group, communicating effectively.
3. Investigate, find, assess and apply information from a variety of sources, using the most suitable information technology solution where necessary.
4. Apply numerical and analytical techniques to solve problems.
5. Critically analyse and effectively use data and information in Computer Science concept.

3.3 Learning Outcomes of the Web Development (WD) Pathway

The WD pathway provides opportunities for students to develop and demonstrate knowledge and understanding, qualities, skills and other attributes in the following areas:

A. Knowledge and understanding of :

Students graduating from the WD pathway should be able to:

1. Develop a good grasp of the principles, concepts and techniques associated with web development, including an understanding of the analysis, design and development processes involved.
2. Effectively use the terms, hypothesis, theories and practices associated with web development at both the individual component and the system level, including the use of appropriate models.

3. Demonstrate a range of social, legal, ethical and professional skills required for continuing professional development in the web development discipline within a world-wide context.
4. Adopt novel solutions in a range of situations in which web technologies/solutions can be applied.
5. Define the possibilities and limitations of the state of the art web based systems.
6. Demonstrate a grasp of key concepts related to Cloud Computing and services, Project Management and Internet Security.

B. Cognitive skills

Students graduating from the WD pathway should be able to:

1. Demonstrate the ability of becoming a computational thinker and to provide efficient web-based solutions.
2. Interrelate theory and practice hence aiding in the comprehension of web development practices and applications.
3. Integrate the main concepts/approaches related to software development and the state-of-the-art web technologies to provide innovative web based solutions, including the recent technologies such as Cloud Computing, Internet of things, etc.
4. Interpret and refine specifications and implementations of web based systems/applications, including testing and critical evaluation.
5. Apply their knowledge and understanding by devising and carrying out innovative projects in Web Development.

C. Practical and/or professional skills

Students graduating from the WD pathway should be able to:

1. Design and develop responsive web solutions.
2. Create, integrate, maintain and optimize advanced web-based systems for different usages.
3. Plan and organize themselves and their work appropriately; keep systematic records of work in progress and outcomes.
4. Evaluate and improve the development of web based systems and portals through an iterative process.
5. Evaluate the Key Performance Indicators of interactive design.
6. Consider important issues such as risk and complexity in their work.

D. Key skills

Students graduating from the WD pathway should be able to:

1. Organise own learning and performance to the level that they are prepared for lifelong learning after graduating.

2. Show and demonstrate a range of transferable skills in, problem solving, communication, project management, self-management, working individually, working in a group in a distance setting and collaborate via computer-mediated communication.
3. Investigate, retrieve, reflect, and assess and use data/information effectively in a web development context.
4. Apply appropriate numerical and mathematical skills to solve practical problems related to web development.

3.4 Learning Outcomes of Networking and Security (N&S) Pathway

The Networking and Security pathway provides opportunities for students to develop and demonstrate knowledge and understanding, qualities, skills and other attributes in the following areas:

A. Knowledge and understanding of:

Students graduating from the N&S pathway should be able to:

1. Define, identify, and describe the fundamental concepts of security at the level of policy and strategy in computer system, principles and techniques associated with wired and wireless communication networks, along with their underlying security challenges and countermeasures, at both the individual component and the system level. This includes topics such as computer system operation and architectures; LANs; WLANs; WANs; fixed and mobile telephone networks; encoding; modulation; multiplexing; routing; switching; protocols; standards; network management and reliability; security and privacy.
2. Describe and evaluate the physical principles underlying computer and digital communication networks, and the mathematical rules governing security algorithms and protocols used in these networks. Critically evaluate security techniques used to protect system and user data.
3. Identify and describe the possibilities and limitations of computer networking and security systems, together with the technological and commercial compromises inherent in the design of such systems.
4. Adopt novel solutions in a range of situations in which networking and security systems can be applied.
5. Describe the interaction of social, historical, economic, political and personal issues with networking systems and their corresponding security measures.
6. Identify the major trends in computer networking and security technologies and recognise the implications of these trends.

B. Cognitive skills

Students graduating from the N&S pathway should be able to:

1. Explain the key concepts related to networks (wired and wireless) and security. Explain the significance of issues such as security and resilience, appreciate the role of firewalls, malware protection, backup strategies etc.
2. Interpret techniques for modeling, designing, developing, problem-solving and testing of communication networks, computer systems and their related security measures and protocols, being aware of the limitations and challenges involved. This includes techniques such as simulating, diagramming, optimising, and their associated tools.
3. Explain, contrast and/or critically analyse and refine specifications of proposals for and/or implementations of networking and communication systems in addition to security techniques, making use of technical literature, simulations and/or mathematical modeling, as appropriate.
4. Express reasoned arguments about social, historical, economic, political and personal issues, as they apply to computer networking and security systems. Appreciate the role of humans in Cyber Security as well as the different sources of threats and how to mitigate against them.
5. Extend their knowledge by designing and carrying out a small personal project in networking and security .

C. Practical and/or professional skills

Students graduating from the N&S pathway should be able to:

1. Use appropriate simulation and modelling tools in order to investigate, analyse, design, evaluate and/or test networking and communication systems in addition to network security systems and methods. Design systems that connect mobile devices and undertake analysis of network traffic, storage media (cards, disks) for evidence of misuse.
2. Plan and organise themselves and their work appropriately; keep systematic records of work in progress and outcomes.
3. Consider and deal with issues such as risk and complexity and evaluation of Network Security alternatives.
4. Critically discuss and assess alternatives for Networking and Security solutions.

D. Key skills

Students graduating from the N&S pathway should be able to:

1. Organise and improve their own learning and performance to the extent that they are prepared for lifelong learning.
2. Communicate and report effectively in the context of networking & security and technology by discussing, describing, and explaining related concepts and ideas.
3. Demonstrate the ability to work independently and as part of a team, gathering and evaluating different types of data/information, identifying problems, developing and documenting solutions, and making effective use of ICT for project management, communication and collaboration.
4. Apply appropriate numerical and mathematical skills.
5. Apply problem-solving skills in the context of networking and security.
6. Apply state –of-the-art tools effectively to support work in networking and security.
7. Survey, retrieve, evaluate, critically asses and effectively use data/information related to networking and security.

3.5 Learning Outcomes of Computing with Business (CwB) Pathway

The CwB pathway provides opportunities for students to develop and demonstrate knowledge and understanding, qualities, skills and other attributes in the following areas:

A. Knowledge and understanding of:

Students graduating from the CwB pathway should be able to:

1. Explain the key concepts of computing, data management and analysis, including principles of design and implementation of IT project, and the representation and meaning of data in a business context.
2. Integrate legal managerial and professional issues in computing.
3. Explain the key concepts of programming languages, algorithms, methods and techniques.
4. Identify Information systems technology including data structure, data bases and the internet.
5. Choose the methods and tools used for IT projects and service management.
6. Identify decision making and support tools.

7. Demonstrate knowledge and understanding of financial management, and human resource management.
8. Demonstrate knowledge and understanding of strategic planning and management of change.

B. Cognitive skills

Students graduating from the CwB pathway should be able to:

1. Analyze practical problems, and use software development concepts to design and evaluate solutions to them.
2. Describe, compare and contrast a variety of IT project management methods and tools, identifying the best choices to apply to specific problems.
3. Explain the various roles, functions and interactions of members of a project management team;
4. Describe business concepts and models and apply them to different aspects of business behaviour.
5. Evaluate business decisions and government business policy.

C. Practical and/or professional skills

Students graduating from the CwB pathway should be able to:

1. Design, develop, test, evaluate, maintain and support computer systems in a business computing environment that are well structured, reliable and usable. They should be able to apply their knowledge to analyse business problems, prepare strategies and make effective decisions to solve such problems.
2. Use modern decision making management tools.
3. Identify and handle the ethical, social and legal issues that may arising from IT project management and use, and from business decisions and policies.

D. Key skills

Students graduating from the CwB pathway should be able to:

1. Demonstrate independency in learning, planning, monitoring, and work accomplishment.
2. Communicate effectively with team members, managers and customers.

3. Plan and manage a project to complete within budget and schedule, appreciate the legal and professional implications of their work and present their work in the form of report.
4. Find, assess and apply information from a variety of sources, using information technology where necessary.
5. Use numerical and analytical techniques to solve problems showing in depth knowledge of IT and business management.

4. Programme Structure

Students seeking a BSc Honours degree in Information Technology and Computing must complete at least 131 credit hours:

1. University requirements / Mandatory (Table 1).
2. University requirements / Elective (Table 2).
3. Faculty requirements / Mandatory (Table 3).
4. Faculty requirements / Elective (Table 4).
5. Faculty core requirements (Table 5 for all Pathways together)

4.1 Programme Requirements (131 Credit Hours)

The different components of the Programme Requirements are as follows: -

Requirements	Points	Credit Hours
University Requirements / Mandatory	60	18
University Requirements / Elective	10	3
Faculty Requirements / Mandatory	30	8
Faculty Requirements / Elective	20	6
Specialisation Requirements / Mandatory	360	96
Total	480	131

The details of the previous requirements will be described as follows:-

4.1.1 University Requirements/ Mandatory (60 points) (18 Credit Hours)

Table 1: Details of University Requirements (Mandatory)

Module Code	Module Title	Credit Hours	Pre-requisites
GR101	Self-Learning Skills	3	--
TU170	Computing Essentials	3	--
AR111	Arabic Communication Skills I	3	--
AR112	Arabic Communication Skills II	3	AR111
EL111	English Communication Skills I	3	--
EL112	English Communication Skills II	3	EL111
Total		18	

4.1.2 University Requirements/ Electives (10 points) (3 Credit Hours)

Table 2: Details of University Requirements (Electives)

Module Code	Module Title	Credit Hours	Pre-requisites
GR111	Arabic Islamic Civilization	3	--
GR112	Issues and Problems of Development in the Arab World	3	--
GR115	Current International Issues and Problems	3	--
GR116	Youth Empowerment	3	--
GR117	Women Empowerment	3	--
GR118	Life skills	3	--
GR121	Environment and Health	3	--
GR131	General Branch Requirement	3	--

Module Code	Module Title	Credit Hours	Pre-requisites
GR110	Islamic Culture Mandatory Course (Sudan)	3	--
LAW107	Human Rights in the International Law (Bahrain)	3	--
BE322/4	Entrepreneurship and Small Business Management	4	B120
EL118	Reading	4	EL111
CHI101	Chinese for Beginners (I)	3	--
CHI102	Chinese for Beginners (II)	3	CHI101
SL101	Spanish for Beginners (I)	3	--
SL102	Spanish for Beginners (II)	3	SL101
FR101	French for Beginners (I)	3	--
FR102	French for Beginners (II)	3	FR101
Total		38	

4.1.3 Faculty Requirements / Mandatory (30 points) (8 Credit Hours)

Table 3: Details of Faculty Requirements (Mandatory)

Module code	Module title	Credit Hours	Points	Source	Pre-requisites
MT129	Calculus and Probability	4	15	AOU	EL099
TM260	Security, Ethics and Privacy in IT and Computing	4	15	AOU	TM111
Total		8			

4.1.4 Faculty Requirements / Elective (20 points) (6 Credit Hours)

Table 4: Details of Faculty Requirements (Electives)

Module code	Module title	Credit Hours	Points	Source	ITC	CS	N&S	WD	CwB	Pre-requisites
MS102	Physics	3	10	AOU	✓	✓	✓	✓	✓	EL111
M109	.NET Programming	3	10	AOU	✓	✓	✓	✓	✓	EL111
MT101	General Mathematics	3	10	AOU	✓	✓	✓	✓	✓	None
TM297	Compression Methods for Multimedia	3	10	AOU	✓					TM112 & MT131
MT390	Image Processing	3	10	AOU	✓					MT132 & M251
TM295	System Modelling	3	10	AOU		✓				MT132
MT372	Parallel Computing	3	10	AOU		✓				M269 & M251
TM290	Cryptography and Internet Security	3	10	AOU			✓			TM112
MT395	Applied Cyber Security	3	10	AOU			✓			TM260
TM287	Web Applications Development	3	10	AOU				✓		TM105
MT380	Service Oriented Architecture	3	10	AOU				✓		M251
TM291	Management Information Systems	3	10	AOU					✓	BUS110 & TM105
TM391	E-commerce	3	10	AOU					✓	B207B & M251

Note- The student will not be allowed to take more than one elective module per level from the above Table-4, according to proper Academic Advising. Core modules of any pathway might serve as Elective modules for other pathways, according to proper Academic Advising.

4.1.5 Specialisation/ Core Requirements (96 Credit Hours)

The students will be encouraged to finish each level before moving on to the next level. The details of core modules are given as follows:-

Table 5: Details of Specialization/Core Requirements

Level	Code	Module title	Source	Point	CHs	ITC	CS	N&S	WD	CwB	Pre-Requisite
1	TM103	Computer Organization and Architecture	AOU	15	4	✓	✓	✓	✓	✓	EL111
	TM105	Introduction to Programming	AOU	15	4	✓	✓	✓	✓	✓	EL111
	MT131	Discrete Mathematics	AOU	15	4	✓	✓	✓	✓	✓	EL111
	MT132	Linear Algebra	AOU	15	4	✓	✓	✓	✓	✓	EL111
	TM111	Introduction to Computing and Information Technology I	OU	30	8	✓	✓	✓	✓	✓	EL111
	TM112	Introduction to Computing and Information Technology II	OU	30	8	✓	✓	✓	✓		TM111
	BUS110	Introduction to Business	AOU	30	8					✓	EL111
ST						120	120	120	120	120	
2	B207A	Shaping Business Opportunities-A	OU	30	8					✓	BUS110
	B207B	Shaping Business Opportunities -B	OU	30	8					✓	B207A
	T215A	Communication and Information Technologies-A	OU	30	8	✓					TM112
	T215B	Communication and Information Technologies-B	OU	30	8	✓					T215A
	T216A	Cisco Networking (CCNA)-A	OU	30	8			✓			TM112
	T216B	Cisco Networking (CCNA)-B	OU	30	8			✓			T216A
	M251	Object-Oriented Programming using Java	AOU	30	8	✓	✓	✓	✓	✓	TM105
	T227	Change, Strategy and Project at Work	OU	30	8		✓	✓	✓		TM112
	M269	Algorithms, Data Structures and Computability	OU	30	8	✓	✓		✓	✓	TM105 & MT131
	TT284	Web Technologies	OU	30	8				✓		TM112
	TM298	Operating Systems	AOU	15	4		✓				TM105 & TM103
TM240	Computer Graphics and Multimedia	AOU	15	4		✓				MT132 & TM105	
ST						120	120	120	120	120	

Level	Code	Module title	Source	Point	CHs	ITC	CS	N&S	WD	CwB	Pre-Requisite	
3	BUS310	Strategic Management	AOU	30	8					✓	B207B	
	T316	Advanced Networking	AOU	30	8			✓			T216B	
	T318	Applied Network Security	AOU	30	8			✓			T216B & TM260	
	TM351	Data Management and Analysis	OU	30	8	✓	✓			✓	M269 & M251	
	TM352	Web, Mobile and Cloud Technologies	OU	30	8			✓	✓	✓	TT284 or M251*	
	TM354	Software Engineering	OU	30	8	✓	✓		✓		M251	
	TM355	Communications Technology	OU	30	8	✓					T215B	
	TM356	Interaction Design and User Experience	OU	30	8				✓		TT284	
	TM366	Artificial Intelligence	AOU	30	8		✓				M269	
	TM471	Graduation Project (ITC pathway)	AOU	30	8	✓					TM355 or TM354 or TM351**	
	TM471	Graduation Project (CS pathway)	AOU	30	8		✓				TM354 or TM366 or TM351**	
	TM471	Graduation Project (NS pathway)	AOU	30	8			✓			T316 or T318 or TM352**	
	TM471	Graduation Project (WD pathway)	AOU	30	8				✓		TM352 or TM354 or TM356**	
	TM471	Graduation Project (CwB pathway)	AOU	30	8					✓	TM351 & BUS310 or TM352 & BUS310**	
ST						120	120	120	120	120		
Total		Total Number of Points per Pathway						360	360	360	360	

ITC: Information Technology and Computing, CS: Computer Science, NS: Networking & Security, WD: Web Development, CwB: Computing with Business ,ST: Sub-total, CHs: Credit Hours

* Based on the selected pathway

** Based on Academic Advising

4.2 Core modules and Recommended Study Plans for ITC pathways

4.2.1 Information Technology and Computing (ITC Pathway)

Core modules for this Pathway are depicted in the following table:

ITC pathway core modules						
Level	Code	Module Title	Source	Points	Credit Hours	Pre-requisites
1	TM103	Computer Organization and Architecture	AOU	15	4	EL111
	TM105	Introduction to Programming	AOU	15	4	EL111
	MT131	Discrete Mathematics	AOU	15	4	EL111
	MT132	Linear Algebra	AOU	15	4	EL111
	TM111	Introduction to Computing and Information Technology I	OU	30	8	EL111
	TM112	Introduction to Computing and Information Technology II	OU	30	8	TM111
ST				120	32	
2	T215A	Communications and Information Technologies-A	OU	30	8	TM112
	T215B	Communications and Information Technologies-B	OU	30	8	T215A
	M251	Object-Oriented Programming using Java	AOU	30	8	TM105
	M269	Algorithms, Data Structures and Computability	OU	30	8	TM105 & MT131
ST				120	32	
3	TM355	Communications Technology	OU	30	8	T215B
	TM351	Data Management and Analysis	OU	30	8	M269 & M251
	TM354	Software Engineering	OU	30	8	M251
	TM471	Graduation Project (ITC Pathway)	AOU	30	8	TM355 or TM354 or TM351
ST				120	32	
Total				360	96	

The Recommended study plan for the ITC Pathway (131 CHs) is as follows: -

First year:

Semester	Modules
1st (13 CHs)	<ul style="list-style-type: none"> - EL111 – English Communication Skills I / 3 Credit Hours - GR101 – Self-Learning Skills / 3 Credit Hours - TU170 – Computing Essentials / 3 Credit Hours - MT129 – Calculus and Probability / 4 Credit Hours
2nd (18 CHs)	<ul style="list-style-type: none"> - AR111 – Arabic Communication Skills I / 3 Credit Hours - EL112 – English Communication Skills II / 3 Credit Hours - MT132 – Linear Algebra / 4 Credit Hours - TM111 – Introduction to Computing and Information Technology I / 8 Credit Hours

Second year:

Semester	Modules
1st (15 CHs)	<ul style="list-style-type: none"> - AR112 – Arabic Communication Skills II / 3 Credit Hours - MT131 – Discrete Mathematics / 4 Credit Hours - TM105 – Introduction to Programming / 4 Credit Hours - TM103 – Computer Organization and Architecture / 4 Credit Hours
2nd (19 CHs)	<ul style="list-style-type: none"> - TM112 - Introduction to Computing and Information Technology II / 8 Credit Hours - M251 – Object-Oriented Programming using Java / 8 Credit Hours - 1 Module from University Requirement/Elective / 3 Credit Hours

Third Year:

Semester	Modules
1st (19 CHs)	<ul style="list-style-type: none">- M269 – Algorithms, Data Structures and Computability / 8 Credit Hours- T215A – Communication and Information Technologies-A / 8 Credit Hours- 1 Module from Faculty Requirements/Elective / 3 Credit Hours
2nd (15 CHs)	<ul style="list-style-type: none">- T215B – Communication and Information Technologies-B / 8 Credit Hours- TM260 – Security, Ethics and Privacy in IT and Computing / 4 Credit Hours- 1 Module from Faculty Requirements/Elective / 3 Credit Hours

Fourth year:

Semester	Modules
1st (20 CHs)	<ul style="list-style-type: none">- TM351 – Data Management and Analysis / 8 Credit Hours- TM354 – Software Engineering / 8 Credit Hours- TM471A – ITC, Graduation Project-A / 4 Credit Hours
2nd (12 CHs)	<ul style="list-style-type: none">- TM355 – Communications Technology / 8 Credit Hours- TM471B – ITC, Graduation Project-B / 4 Credit Hours

4.2.2 Computer Science (CS Pathway)

Core modules for this Pathway are depicted in the following table:

Computer Science pathway core modules						
Level	Code	Module Title	Source	Points	Credit Hours	Pre-requisites
1	TM103	Computer Organization and Architecture	AOU	15	4	EL111
	TM105	Introduction to programming	AOU	15	4	EL111
	MT131	Discrete Mathematics	AOU	15	4	EL111
	MT132	Linear Algebra	AOU	15	4	EL111
	TM111	Introduction to Computing and Information Technology I	OU	30	8	EL111
	TM112	Introduction to Computing and Information Technology II	OU	30	8	TM111
ST				120	32	
2	M251	Object-Oriented programming using Java	AOU	30	8	TM105
	T227	Change, Strategy and Project at Work	OU	30	8	TM112
	M269	Algorithms, Data Structures and Computability	OU	30	8	TM105 & MT131
	TM298	Operating Systems	AOU	15	4	TM105&TM103
	TM240	Computer Graphics and Multimedia	AOU	15	4	MT132&TM105
ST				120	32	
3	TM351	Data Management and Analysis	OU	30	8	M269 & M251
	TM354	Software Engineering	OU	30	8	M251
	TM366	Artificial Intelligence	AOU	30	8	M269
	TM471	Graduation Project (CS Pathway)	AOU	30	8	TM354 or TM366 or TM351
ST				120	32	
Total				360	96	

The Recommended study plan for the Computer Science (CS) Pathway (131 CHs)

First year:

Semester	Modules
1st (13 CHs)	<ul style="list-style-type: none">- EL111 – English Communication Skills I / 3 Credit Hours- GR101 – Self-Learning Skills / 3 Credit Hours- TU170 – Computing Essentials / 3 Credit Hours- MT129 – Calculus and Probability / 4 Credit Hours
2nd (18 CHs)	<ul style="list-style-type: none">- AR111 – Arabic Communication Skills I / 3 Credit Hours- EL112 – English Communication Skills II / 3 Credit Hours- MT132 – Linear Algebra / 4 Credit Hours- TM111 – Introduction to Computing and Information Technology I / 8 Credit Hours

Second year:

Semester	Modules
1st (15 CHs)	<ul style="list-style-type: none">- AR112 – Arabic Communication Skills II / 3 Credit Hours- MT131 – Discrete Mathematics / 4 Credit Hours- TM105 – Introduction to Programming / 4 Credit Hours- TM103 – Computer Organization and Architecture / 4 Credit Hours
2nd (19 CHs)	<ul style="list-style-type: none">- TM112 - Introduction to Computing and Information Technology II / 8 Credit Hours- M251 – Object-Oriented Programming using Java / 8 Credit Hours- 1 Module from University Requirement/Elective / 3 Credit Hours

Third year:

Semester	Modules
1st (19 CHs)	<ul style="list-style-type: none">- M269 – Algorithms, Data Structures and Computability / 8 Credit Hours- T227 – Change, Strategy and Project at Work/ 8 Credit Hours- 1 Module from Faculty Requirements /Elective / 3 Credit Hours
2nd (15 CHs)	<ul style="list-style-type: none">- TM240 – Computer Graphics and Multimedia / 4 Credit Hours- TM260 – Security, Ethics and Privacy in IT and Computing / 4 Credit Hours- TM298 – Operating Systems / 4 Credit Hours- 1 Module from Faculty Requirements/Elective / 3 Credit Hours

Fourth year:

Semester	Modules
1st (20 CHs)	<ul style="list-style-type: none">- TM351 – Data Management and Analysis / 8 Credit Hours- TM354 – Software Engineering / 8 Credit Hours- TM471A – CS, Graduation Project-A / 4 Credit Hours
2nd (12 CHs)	<ul style="list-style-type: none">- TM366 – Artificial Intelligence / 8 Credit Hours- TM471B – CS, Graduation Project-B / 4 Credit Hours

4.2.3 Networking & Security (N&S Pathway)

Core modules for this Pathway are depicted in the following table:

Networking & Security pathway core modules						
Level	Code	Module Title	Source	Points	Credit Hours	Pre-requisites
	TM103	Computer Organization and Architecture	AOU	15	4	EL111
	TM105	Introduction to programming	AOU	15	4	EL111
	MT131	Discrete Mathematics	AOU	15	4	EL111
	MT132	Linear Algebra	AOU	15	4	EL111
	TM111	Introduction to Computing and Information Technology I	OU	30	8	EL111
	TM112	Introduction to Computing and Information Technology II	OU	30	8	TM111
ST				120	32	
2	T216A	Cisco Networking (CCNA)-A	OU	30	8	TM112
	T216B	Cisco Networking (CCNA)-B	OU	30	8	T216A
	M251	Object-Oriented programming using Java	AOU	30	8	TM105
	T227	Change, Strategy and Project at Work	OU	30	8	TM112
ST				120	32	
3	T316	Advanced Networking	AOU	30	8	T216B
	T318	Applied Network Security	AOU	30	8	T216B & TM260
	TM352	Web, Mobile and Cloud Technologies	OU	30	8	M251
	TM471	Graduation Project –(N&S Pathway)	AOU	30	8	T316 or T318 or TM352
ST				120	32	
Total				360	96	

The Recommended study plan for the Networking & Security (NS) Pathway (131 CHs) is as follows: -

First year:

Semester	Modules
1 st (13 CHs)	<ul style="list-style-type: none"> - EL111 – English Communication Skills I / 3 Credit Hours - GR101 – Self-Learning Skills / 3 Credit Hours - TU170 – Computing Essentials / 3 Credit Hours - MT129 – Calculus and Probability / 4 Credit Hours
2 nd (18 CHs)	<ul style="list-style-type: none"> - AR111 – Arabic Communication Skills I / 3 Credit Hours - EL112 – English Communication Skills II / 3 Credit Hours - MT132 – Linear Algebra/ 4 Credit Hours - TM111 – Introduction to Computing and Information Technology I / 8 Credit Hours

Second year:

Semester	Modules
1 st (15 CHs)	<ul style="list-style-type: none"> - AR112 – Arabic Communication Skills II / 3 Credit Hours - MT131 – Discrete Mathematics / 4 Credit Hours - TM105 – Introduction to Programming / 4 Credit Hours - TM103 – Computer Organization and Architecture / 4 Credit Hours
2 nd (19 CHs)	<ul style="list-style-type: none"> - TM112 - Introduction to Computing and Information Technology II / 8 Credit Hours - M251 – Object-Oriented Programming using Java / 8 Credit Hours - 1 module from University Requirement/Elective / 3 Credit Hours

Third year:

Semester	Modules
1 st (19 CHs)	<ul style="list-style-type: none"> - T216A – Cisco Networking (CCNA)-A / 8 Credit Hours - T227 – Change, Strategy and Project at Work / 8 Credit Hours - 1 Module from Faculty Requirements/Elective / 3 Credit Hours
2 nd (15 CHs)	<ul style="list-style-type: none"> - TM260 – Security, Ethics and Privacy in IT and Computing / 4 Credit Hours - T216B – Cisco Networking (CCNA)-B / 8 Credit Hours - 1 Module from Faculty Requirements/Elective / 3 Credit Hours

Fourth year:

Semester	Modules
1 st (20 CHs)	<ul style="list-style-type: none"> - T316 – Advanced Networking / 8 Credit Hours - TM352 – Web, Mobile and Cloud Technologies / 8 Credit Hours - TM471A – N&S, Project-A / 4 Credit Hours
2 nd (12 CHs)	<ul style="list-style-type: none"> - T318 – Applied Network Security / 8 Credit Hours - TM471B – N&S, Project-B / 4 Credit Hours

4.2.4 Web Development (WD Pathway)

Core modules for this Pathway are depicted in the following table:

Web Development pathway core modules						
Level	Code	Module Title	Source	Points	Credit Hours	Pre-requisites
1	TM103	Computer Organization and Architecture	AOU	15	4	EL111
	TM105	Introduction to programming	AOU	15	4	EL111
	MT131	Discrete Mathematics	AOU	15	4	EL111
	MT132	Linear Algebra	AOU	15	4	EL111
	TM111	Introduction to Computing and Information Technology I	OU	30	8	EL111
	TM112	Introduction to Computing and Information Technology II	OU	30	8	TM111
ST				120	32	
2	M251	Object-Oriented programming using Java	AOU	30	8	TM105
	T227	Change, Strategy and Project at Work	OU	30	8	TM112
	M269	Algorithms, Data Structures and Computability	OU	30	8	TM105 & MT131
	TT284	Web Technologies	OU	30	8	TM112
ST				120	32	
3	TM352	Web, Mobile and Cloud Technologies	OU	30	8	TT284
	TM354	Software Engineering	OU	30	8	M251
	TM356	Interaction Design and User Experience	OU	30	8	TT284
	TM471	Graduation Project (WD Pathway)	AOU	30	8	TM352 or TM354 or TM356
ST				120	32	
Total				360	96	

The Recommended study plan for the Web Development (WD) Pathway (131 CHs) is as follows: -

First year:

Semester	Modules
1st (13 CHs)	<ul style="list-style-type: none">- EL111 – English Communication Skills I / 3 Credit Hours- GR101 – Self-Learning Skills / 3 Credit Hours- TU170 – Computing Essentials / 3 Credit Hours- MT129 – Calculus and Probability / 4 Credit Hours
2nd (18 CHs)	<ul style="list-style-type: none">- AR111 – Arabic Communication Skills I / 3 Credit Hours- EL112 – English Communication Skills II / 3 Credit Hours- MT132 – Linear Algebra / 4 Credit Hours- TM111 – Introduction to Computing and Information Technology I / 8 Credit Hours

Second year:

Semester	Modules
1st (15 CHs)	<ul style="list-style-type: none">- AR112 – Arabic Communication Skills II / 3 Credit Hours- MT131 – Discrete Mathematics / 4 Credit Hours- TM105 – Introduction to Programming / 4 Credit Hours- TM103 – Computer Organization and Architecture / 4 Credit Hours
2nd (19 CHs)	<ul style="list-style-type: none">- TM112 - Introduction to Computing and Information Technology II / 8 Credit Hours- M251 – Object-Oriented Programming using Java / 8 Credit Hours- 1 Module from University Requirement/Elective / 3 Credit Hours

Third year:

Semester	Modules
1st (19 CHs)	<ul style="list-style-type: none">- M269 – Algorithms, Data Structures and Computability / 8 Credit Hours- T227 – Change, Strategy and Project at Work / 8 Credit Hours- 1 module from Faculty Requirements /Elective / 3 Credit Hours
2nd (15 CHs)	<ul style="list-style-type: none">- TM260 – Security, Ethics and Privacy in IT and Computing / 4 Credit Hours- TT284 – Web Technologies / 8 Credit Hours- 1 Module from Faculty Requirements/Elective / 3 Credit Hours

Fourth year:

Semester	Modules
1st (20 CHs)	<ul style="list-style-type: none">- TM352 – Web, Mobile and Cloud Technologies / 8 Credit Hours- TM354 – Software Engineering / 8 Credit Hours- TM471A – WD, Project-A / 4 Credit Hours
2nd (12 CHs)	<ul style="list-style-type: none">- TM356 – Interaction Design and the User Experience / 8 Credit Hours- TM471B – WD, Project-B / 4 Credit Hours

4.2.5 Computing with Business (CwB Pathway)

Core modules for this Pathway are depicted in the following table:

Computing with Business pathway core modules						
Level	Code	Module Title	Source	Points	Credit Hours	Pre-requisites
1	TM103	Computer Organization and Architecture	AOU	15	4	EL111
	TM105	Introduction to Programming	AOU	15	4	EL111
	MT131	Discrete Mathematics	AOU	15	4	EL111
	MT132	Linear Algebra	AOU	15	4	EL111
	TM111	Introduction to Computing and Information Technology I	OU	30	8	EL111
	B110	Introduction to Business	AOU	30	8	EL111
ST				120	32	
2	B207A	Shaping Business Opportunities-A	OU	30	8	BUS110
	B207B	Shaping Business Opportunities -B	OU	30	8	B207A
	M251	Object-Oriented Programming using Java	AOU	30	8	TM105
	M269	Algorithms, Data Structures and Computability	OU	30	8	TM105 & MT131
ST				120	32	
3	BUS310	Strategic Management	AOU	30	8	B207B
	TM351	Data Management and Analysis	OU	30	8	M269 & M251
	TM352	Web, Mobile and Cloud Technologies	OU	30	8	M251
	TM471	Graduation Project -CWB	AOU	30	8	TM351 & BUS310 or TM352 & BUS310
ST				120	32	
Total				360	96	

The Recommended study plan for the Computing with Business (CwB) Pathway (131 CHs) is as follows: -

First year:

Semester	Modules
1st (13 CHs)	<ul style="list-style-type: none">- EL111 – English Communication Skills I / 3 Credit Hours- GR101 – Self-Learning Skills / 3 Credit Hours- TU170 – Computing Essentials / 3 Credit Hours- MT129 – Calculus and Probability / 4 Credit Hours
2nd (18 CHs)	<ul style="list-style-type: none">- AR111 – Arabic Communication Skills I / 3 Credit Hours- EL112 – English Communication Skills II / 3 Credit Hours- MT132 – Linear Algebra/ 4 Credit Hours- TM111 – Introduction to Computing and Information Technology I / 8 Credit Hours

Second year:

Semester	Modules
1st (15 CHs)	<ul style="list-style-type: none">- AR112 – Arabic Communication Skills II / 3 Credit Hours- MT131 – Discrete Mathematics / 4 Credit Hours- TM105 – Introduction to Programming / 4 Credit Hours- TM103 – Computer Organization and Architecture / 4 Credit Hours
2nd (19 CHs)	<ul style="list-style-type: none">- BUS110 – Introduction to Business / 8 Credit Hours- M251 – Object-Oriented Programming using Java / 8 Credit Hours- 1 Module from University Requirement/Elective / 3 Credit Hours

Third year:

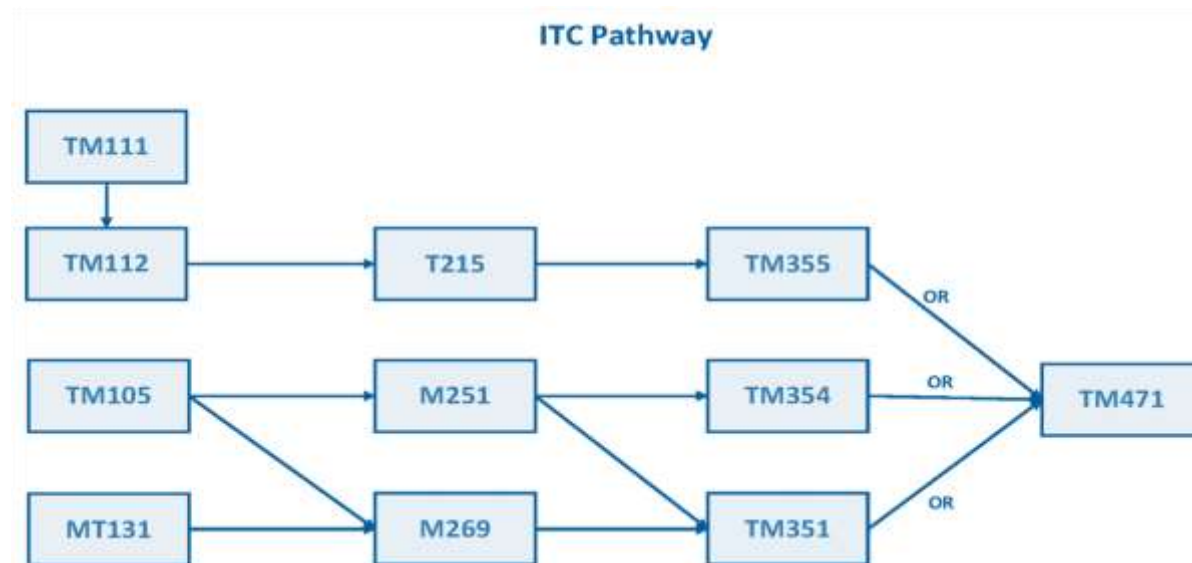
Semester	Modules
1st (19 CHs)	<ul style="list-style-type: none">- B207A – Shaping Business Opportunities-A / 8 Credit Hours- M269 – Algorithms, Data Structures and Computability / 8 Credit Hours- 1 Module from Faculty Requirements/Elective / 3 Credit Hours
2nd (15 CHs)	<ul style="list-style-type: none">- B207B – Shaping Business Opportunities-B / 8 Credit Hours- TM260 – Security, Ethics and Privacy in IT and Computing / 4 Credit Hours- 1 Module from Faculty Requirements/Elective / 3 Credit Hours

Fourth year:

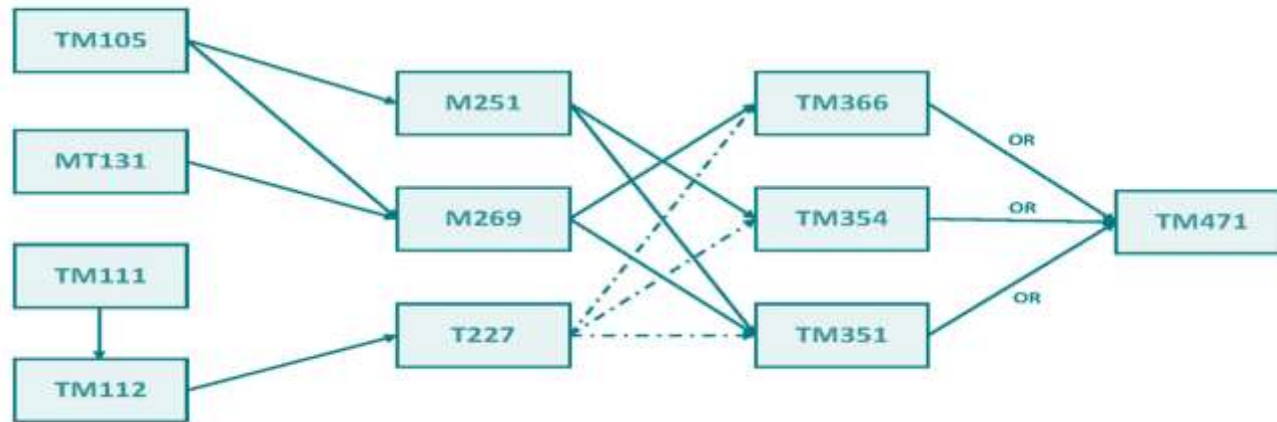
Semester	Modules
1st (20 CHs)	<ul style="list-style-type: none">- BUS310 – Strategic Management / 8 Credit Hours- TM351 – Data Management and Analysis / 8 Credit Hours- TM471A – CB, Project-A / 4 Credit Hours
2nd (12 CHs)	<ul style="list-style-type: none">- T352 – Web, Mobile and Cloud Technologies / 8 Credit Hours- TM471B – CB, Project-B / 4 Credit Hours

4.3 Critical Path Analysis for the proposed Pathways

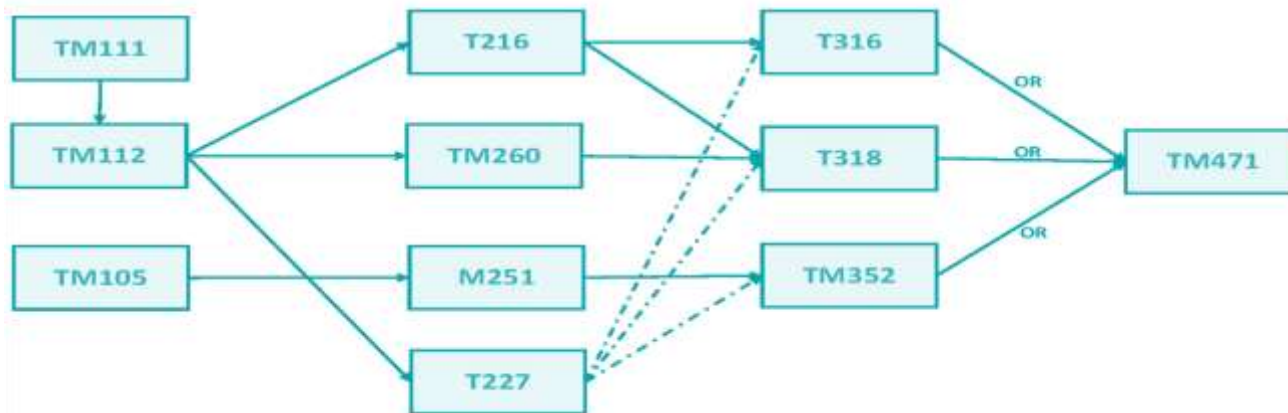
The Critical Pathways for all the five pathways of the ITC Programme of study are shown below. A Critical Pathway denotes the inter-dependencies of a module based on the pre-requisites and this affects the progression of students in the ITC Programme. The Critical Pathway clearly denotes the graphical manner the modules that the students must complete from Level 1 to Level 3 in order to reach the graduation project stage and finish his/her study.



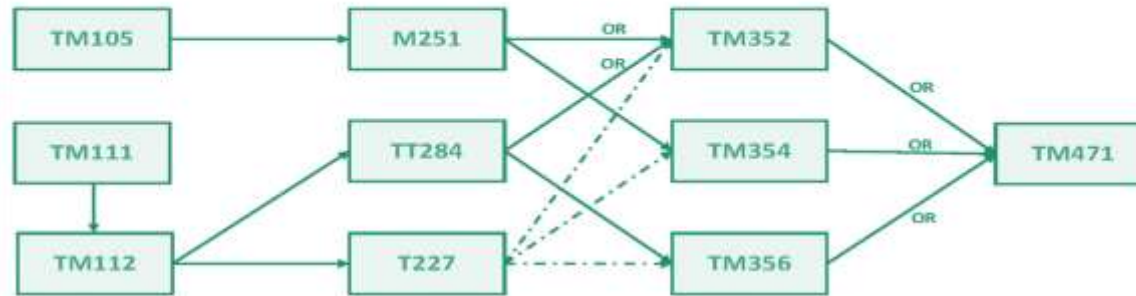
Computer Science Pathway



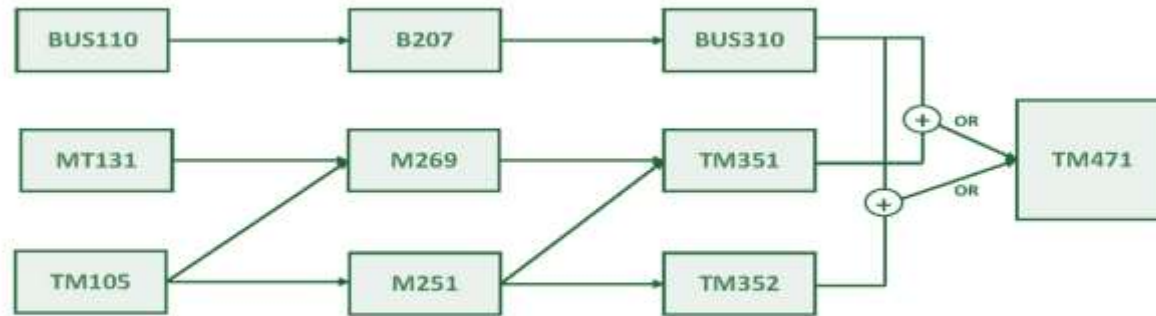
Networking & Security Pathway



Web Development Pathway



Computing with Business Pathway



— Prerequisite
 - - - Complementary

5. Distinctive features of the programme structure

Where applicable, this section provides details on distinctive features such as:

- where in the structure above a professional/placement year fits in and how it may affect progression
- any restrictions regarding the availability of elective modules
- where in the programme structure students must make a choice of pathway/route

The distinctive features of this programme are:

1. Dual Award (AOU and OU UK awards).
2. CICP validated award.
3. Multiple pathways that offer a wide possibility of pathway choice.
4. OU, UK Learning material customized for self-directed learning.
5. Flexibility (Duration 8 years with 25% F2F tutoring sessions + 75% independent study, wide range of Final project topics).
6. Tutorials are delivered by tutors with professional experience in IT and computing in addition to their academic experience which contributes to preparing our graduates for the employment market.
7. The practical nature of the programme, as most of the programme modules are strongly related to the specialization.
8. Boosted by the collective intelligence of 8 teams of tutors at 8 branches.
9. One of the largest ITC programme in the Arab World (more than 9000 students) which is recognized by 8 different MOHEs in addition to the validation of its award by the CICP in UK.
10. There are opportunities for transfer between pathways.

6. Support for students and their learning

Support is provided for students through a variety of means:

- Induction sessions (to the ITC programme, e-Library, IT and LMS).
- Research informed tutoring.
- Academic advisors.
- AOU Policies :
 - Teaching and Learning policy
 - Plagiarism Policy https://www.arabou.edu.kw/index.php?option=com_k2&view=item&layout=item&id=90&Itemid=463&lang=en
 - Appeals and complaints https://www.arabou.edu.kw/index.php?option=com_k2&view=item&layout=item&id=321&Itemid=864&lang=en
https://www.arabou.edu.kw/index.php?option=com_k2&view=item&layout=item&id=328&Itemid=872&lang=en
- AOU's online Moodle based Learning Management System with learning resources.
- Face-to-face tutorials.
- Practical laboratory sessions.
- Tutors' office hours.
- Formative feedback on TMAs and MTAs.
- Written guidance including:
 - Module Guide: (Please refer to the AOU website)
 - Student Handbook (available online). (Please refer to the AOU website)
 - Student Guide on Plagiarism:
 - Advice on programme structure.
- Lectures through video conferencing.
- Support material (video lectures, java applets, simulations, etc.) to supplement and enhance the UK OU material: (Please refer to the AOU website)
- Mock exam papers are provided to students
- ICT facilities.

- IT Help Desk.
- Student email.
- Wireless Internet access in most of the AOU country campuses.
- Online Student Support System (SSS)
- Disability and Dyslexia online support system.
- PASS (Peer Assisted Student Support).
- eLibrary and other learning resources: (Please refer to the AOU website)
- Academic Counselling is provided by academic counsellors.
- Personal Development Planning (PDP).
- Student representatives in the Student-Staff Liaison Committee (SSLC), and Academic Committee allowing students to share in the decision making process.
- Career planning guidance and services.
- The Students' Union exists at AOU.

7. Criteria for admission

The standard criterion for admission to FCS programme is a high school certificate or its equivalent in the scientific pathway. The FCS follows the AOU's policies and Rules and Regulations, considering the students' entry into the undergraduate ITC programme. The main Entry Requirement into the ITC Programme is a valid High School certificate.

Bylaws exist for handling all cases of Module Equivalencies including the following scenarios:

A. Graduates at AOU interested in studying another Major:

B. Students wishing to Transfer from one Programme to another

C. Students wishing to transfer from one stream to another within the same major:

Please refer to Module Equivalencies Bylaws at AOU for details about above cases of Module Equivalencies.

8. Language of study

English

9. Information about assessment regulations

9.1 Criteria for assessment

The FCS follows the AOU's assessment policies, rules and regulations like all the other faculties of the University. The assessments at AOU comprise of 3 essential components as follows:

- 1. Tutor Marked Assignment (TMA)**
- 2. Mid-Term Assessment (MTA)**
- 3. Final Exam**

Weightages of Assessment Components for regular modules:

The weightages of the 3 assessment components are as follows:

- 20% for TMA,
- 30% for MTA
- 50% for the Final Exam.

Formative and Summative parts of Assessments:

The TMA and the MTA parts of the assessment form the Continuous Assessment component at AOU. The TMA assessment component is part of the Formative Assessment at AOU and detailed feedback is provided to students on their TMA work. The MTA and Final Examinations are part of the Summative Assessment at AOU.

Formative Assessment – TMA

Summative Assessment – MTA and Final Exam

Feedback on Assessment:

The students are provided detailed feedback on their TMA work and this is an essential part of learning at AOU. Tutors use a detailed form for this purpose in which marks for each part of the TMA are clearly distributed. The feedback form also has specific area for the tutors to provide feedback to students concerning their Strengths, Weaknesses and Steps for improvement. The tutor uses this form to provide detailed feedback to students and to suggest corrective and improvement actions. Feedback is also provided to students during in class face-to-face tutorials and during Lab and Office Hours maintained by the tutors.

9.2 Main Principles underpinning the processes of Assessment at AOU

The main Principles underpinning the processes of Assessment at AOU include:

1. All forms of assessment must aim to test the Learning Outcomes (LOs) associated with the module.
2. The creation and administration of all types of assessment is the work of teams, not individuals (e.g. staff tutors, branch module coordinators, module chairs, programme coordinators, faculty dean and external examiners).
3. The same measures should be applied to the marking of students' products in all branches.

9.3 The Grade Point Average and Equivalent Letter Grades:

The AOU follows the Grade Point Average (GPA) on a scale of 0 to 4 in its grading processes, i.e., the different categories of achievement are distinguished by awarding students grades on a scale from 0 to 4 as given below:

Letter grade	Points
A	4.0
B+	3.5
B	3.0
C+	2.5
C	2.0
D	1.5
F	0.0

9.4 Quality of Assessment:

The mapping between the GPA and with the equivalent Letter Grades is given below in tabular form:

Cumulative Average	Grade
3.67-4.00	Excellent
3.00-3.66	Very Good
2.33-2.99	Good
2.00-2.32	Pass

It is mentioned here that QAA defined Benchmark standards including the threshold level, the typical level and the excellence level are taken into consideration in the preparation of the assessment materials. The assessment materials contain questions of appropriate difficulty level standard in order to differentiate students according to their knowledge level and skills. The assessment materials are subject to external examiner's scrutiny to ensure that standards are compatible to institutions of similar standings in the UK.

9.5 Arrangements for the involvement of external examiners in the assessment process

External Examiners are actively involved in the assessment process. The draft MTAs, TMAs and Examinations are sent to the External Examiners for feedback and comment. Visits are arranged for the External Examiners and samples of TMAs, MTAs and Examinations are provided for their scrutiny and evaluation.

The External Examiners write reports and may highlight areas of concern for the Faculty to consider and resolve. The Faculty analyses their reports and takes appropriate action. The Faculty then prepares a response document to the report and sends a copy to the EE.

The FCS maintains contact with External Examiners throughout the semester, and informs them about any issues that arise concerning student assessment. The External Examiners are involved in establishing the quality of the academic delivery, academic material preparation, assessment and guidance throughout the semester. All External Examiners are members of Module Assessment Committee and Faculty Examination Committee. The Chief External Examiner is also a member of Central Examination Committee.

9.6 Composition of the examinations committees

The AOU has a four-tiered Examination Board structure consisting of the following:

- Branch Examination Committee (BEC)
- Module Assessment Committee (CAC)
- Faculty Examination Committee (FEC)
- Central Examination Committee (CEC)

The composition of all examination boards has been clearly spelled out in the **AOU Examination Rules and Regulations**. The composition of all examination boards is appropriately maintained by the AOU administration. Marks submitted by branches are considered at HQ by Module Assessment Committee (CAC), Faculty Examination Committee (FEC) and ultimately by Central Examination Committee (CEC). In this way, cross-branch review is achieved.

9.7 Double-marking and Cross Branch Marking by internal examiners

Appropriate arrangements exist for internal and external review. Internal review at branch level considers border-line cases, which are forwarded to Course Assessment Committee (CAC) and Faculty Examination Committee (FEC) for further consideration, where issues such as inter-branch variations are considered.

There is appropriate arrangement for Group Marking, Anonymous Marking and Double Marking. During Group marking under the supervision of the BCC, internal review is undertaken. Double-marking is undertaken as part of the tutor monitoring process in which the BCC evaluates the performance of the tutors.

Cross Branch Marking (CBM) is performed for ITC modules to ensure uniformity of script marking. The Deanship collects scripts from branches for various modules and these are distributed to other selected branches for the purpose of CBM. Cross Branch Marking reports are generated by the concerned tutors and the Deanship ensures that marking across branches is standardised and uniform.

9.8 Validity and objectivity of the assessment process

The assessment process is valid and objective in nature (please refer to Appendix D of the Background document) since the entire process is open and accessible to External Examiners' scrutiny. The External Examiners are involved both in the preparation and execution of all components of the assessment process. During the preparation stage, the External Examiners are sent the assessment material (TMAs and the Examinations) prepared by GCCs for their scrutiny and feedback. After the execution of the TMA work and Examinations, the External Examiners are provided with samples of student work, marked by internal examiners, for review.

9.9 Security and integrity of assessment procedures

The assessment procedures are secure and we have full confidence in their integrity and trustworthiness. The following steps are implemented to ensure the security and integrity of the assessment procedures:

- All examinations are protected by password security.
- Examinations are prepared by the GCCs and all are handled by the FCS Dean
- The Deanship communicates with the External Examiners regarding feedback on examination papers.
- After the examinations are finalised the Deanship sends them to the central Exam Office at the HQ about ten days before the examination date for printing and sending by courier to the branches in sealed envelopes.
- At the Branch, only one responsible examination officer is nominated to handle the examinations.
- The examinations officer keeps the sealed and signed envelopes of examination papers under lock and key in a safe storage place.
- The examination officer takes out the examination papers about half-an-hour prior to the start time to give them to invigilators.
- All examinations are time-synchronized to avoid students of one branch leaking exams to students of other branches.
- For TMAs, the integrity of the solutions is ensured by providing the solutions to tutors very close to the cut-off date to avoid leakages of solutions due to intentional or unintentional means.
- Plagiarism on TMAs is an issue which all education institutions are grappling with. We now have Turnitin plagiarism detection software to address the issue. (Please refer to the AOU website for the Plagiarism Policy.)
- MTAs are prepared by the BCCs and then sent to the GCC and External Examiner for standardisation and quality assurance.

10. Methods for evaluating and improving the quality and standards of teaching and learning.

Multiple methods are used to evaluate and improve the quality and standards of teaching and learning such as:

Link for Learning and Teaching Strategy https://www.arabou.edu.kw/images/reg/final_learning_strategy.pdf

10.1 Programme

1. Periodic review and revalidation of programme by an external panel (Revalidation every 5 years)
2. Annual Programme Evaluation (APE): The programme management team completes an annual programme evaluation report which identifies strengths and weaknesses. This takes account of the views of tutors, students and any issues raised by the external examiners. A detailed action plan is the produced accordingly and communicated to all programme coordinators at the eight branches to leverage our strengths and address our weaknesses.
3. External Verifier/Examiner
4. Quarterly Periodic Reports (QR)
5. Subject areas committees at FCS
6. Academic reviewer's involvement in the programme review
7. Reviews made by local ministries of higher education
8. Feedback from students
9. Feedback from employers
10. Feedback from Alumni
11. Academic standards committee involvement in programme updates

10.2 Teaching and Learning

1. Feedback from students (through Questionnaires, SSLC, meetings with PCs, Deans, and VRAA)
2. Tutor monitoring by the Programme Coordinator
3. General Module Chair (GCC) and Branch Module Coordinators (BCCs) monitor the delivery
4. Exit surveys
5. Feedback from AOU Alumni

6. Peer feedback on the tutoring process
7. Tutor development activities such as development modules, workshops and research seminars
8. Annual staff appraisal
9. Best tutor awards encourage excellence in tutoring

10.3 Assessment

1. Quality assurance and oversight by the deanship
2. External examiners involvement in module assessment committees (CACs)
3. External examiners reports
4. Feedback from tutors
5. Prompt feedback on student's formative assessment (TMAs, MTA)

TMA Enhancement Plan: Based on the feedback received from our team of External Examiners, tutors and members of the Faculty Council, the FCS has initiated a TMA Enhancement Plan through a Pilot Project over the past 2 years. The Enhancement Plan aims to address issues/ challenges of plagiarism in TMA in order to make the TMA process more conducive to the students learning.

Based on this TMA Enhancement Pilot Project, the following have been recommended:

Math Courses:

- o One TMA-based Home Work Assignment: 10%.
- o One TMA-based In-Class Quiz: 10%.

Programming Courses:

- o One TMA-based Project: 10%.
- o One TMA-based In-Class Quiz: 10%.

Non-Programming Courses:

- o One TMA-based Home Work Assignment: 10%.
- o One TMA-based In-Class Quiz: 10%.

The TMA Enhancement Pilot Project is currently implemented for three Level-1 modules and the FCS intends to extend it to all AOULevel-1 modules.

10.4 General feedback

1. Cross-programme discussions with all branches through the members of the academic committee
2. Implementation of best practices in 8 different branches with 4 different Faculties.

10.5 Committees for monitoring and evaluating quality and standards:

1. Module Assessment Committee (CAC)
2. Faculty Board (FB)
3. Academic Committee (AC)
4. Academic Standards Committee (ASC)
5. AOU's Quality Assurance Committee (QAC)
6. Revalidation Panel
7. Student-Staff Liaison Committee (SSLC)

10.6 Key performance and quality Indicators

1. Successful revalidation since 2007 (each 5 years). The Programme was initially validated in 2002
2. Continuous recognition by local ministries of higher education in 8 countries
3. Acceptable student retention, progression and graduation rates.
4. High proportion of our Alumni find jobs immediately after graduation
5. Examination results are comparable with HESA data provided by CICP
6. Research informed tutoring
7. Fund raising for research projects by our tutor's team
8. External examiners team reports indicating the high quality of the learning material and delivery (**Extracts of External Examiners Reports**)
 - a) "I can confirm that the standards are comparable to similar programmes I am familiar with in the UK, and in line with the Computing Subject Benchmark as well as the UK Higher Education Qualification Framework".

- b)** “It is encouraging to see that the programme put in place seems to be working. There is clear improvement in students’ ability to critically analyse others’ work and be critical of their own too. Referencing and plagiarism seem to be moving in the right direction too”.
- c)** “Overall, very encouraged by the clear improvements in almost all departments related to the quality of students’ work”.
- d)** “As with previous reports, I can confirm that the programme uses a range of assessment types that cover the modules and Programme Learning Outcomes. All the information needed to scrutinize the assessment process was made available”.
- e)** “Greater use of the LMS system is commended”.
- f)** “Assessment material is designed in line with the learning outcomes, both at module and programme levels. I have had the opportunity to comment on these prior to the assessment being given to students. A new bank of questions is developed, which seems to help the processes of setting the assessment, marking and discouraging plagiarism”.
- g)** “I can confirm, on behalf of my External Examiners colleagues that the assessment and standards are appropriate and that, in the main, the processes of assessment and determination of grades/marks are fair, consistent and sound across the provision”.

References

Subject Benchmark Statements form part of the UK Quality Code for Higher Education (Quality Code) which sets out the Expectations that all providers of UK higher education reviewed by QAA are required to meet. They are a component of Part A: Setting and Maintaining Academic Standards, which includes the Expectation that higher education providers ‘consider and take account of relevant Subject Benchmark Statements’ in order to secure threshold academic standards. Subject Benchmark Statements describe the nature of study and the academic standards expected of graduates in specific subject areas, and in respect of particular qualifications. They provide a picture of what graduates in a particular subject might reasonably be expected to know, do and understand at the end of their programme of study.

Subject Benchmark Statements are used as reference points in the design, delivery and review of academic programmes. They provide general guidance for articulating the learning outcomes associated with the programme, but are not intended to represent a national curriculum in a subject or to prescribe set approaches to teaching, learning or assessment.

The following references have been used for programme design and preparation of this document:

- QAA's Subject Bench Mark: Computing, February 2016 (<http://www.qaa.ac.uk/en/Publications/Documents/SBS-Computing-16.pdf>)
- Computer Science Curricula Guidelines 2013, ACM-IEEE Computer Society.
<https://www.acm.org/education/CS2013-final-report.pdf>
- OU's Computing and IT Prospectus, 2016-2017
- Reviewing the requirement for high level STEM skills, 2015 conducted by the UK Commission for Employment and Skills.
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/444048/High_level_STEM_skills_requirements_in_the_UK_labour_market_FINAL.pdf
- QAA Subject Benchmark Statement for Computing (2007)
(<http://www.qaa.ac.uk/academicinfrastructure/benchmark/statements/computing07.pdf>)
- <https://www.facebook.com/worldeconomicforum/videos/10153882884451479/>
- https://www.weforum.org/agenda/2016/10/2017s-most-in-demand-skills-according-to-linkedin?utm_content=buffer23af8&utm_medium=social&utm_source=facebook.com&utm_campaign=buffer
- http://uk.businessinsider.com/skills-that-can-get-you-hired-2016-10?utm_source=feedly&utm_medium=webfeeds?r=US&IR=T
- Wills, Sandra, “Strategic Planning for Blended eLearning”, University of Wollongong.

- Hussein, A.S, and Khan, H.A, “Student Performance Tracking in Distributed Open Education using Big Data Analytics”, to be presented in the Second International Conference on Internet of Things, Data& Cloud Computing (ICC 2017), University of Cambridge, UK, 22-23 March,2017.
- Skills that can get you hired in 2017 http://uk.businessinsider.com/skills-that-can-get-you-hired-2016-10?utm_source=feedly&utm_medium=webfeeds?r=US&IR=T
- OU UK Website <http://www3.open.ac.uk/study/>
- Arab Open University, ITC Revalidation documents, September 2012.
- Arab Open University, Learning and Teaching Strategy https://www.arabou.edu.kw/images/reg/final_learning_strategy.pdf
- Arab Open University, Plagiarism https://www.arabou.edu.kw/files/plagiarism_mat.pdf
- Arab Open University, ITC-External Examiners' reports and discussions
- Arab Open University Strategic Plan, Policies and Regulations.
- Research expertise of FCS academic members.