21 September University of Medical and Applied Sciences

Cyber security and digital forensics, B.Sc. (Hons.)

Program Specifications

Preparation Committee:

Dr. Hamzah Ali Abdulrahman Qasem	Chairman	_____
Dr. Abdulrahman Mohemmed Obaid	Member	_____
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Dr. Awadh Ali Abdo Mohammed	Member	_____

2025

Approved By

Department Head	Faculty Dean	Quality Unit	Vice President

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1. Program Identification and Ge0neral Information:		
1	**Scientific name of the program:**	Cyber security and digital forensics, B.Sc. (Hons.)
2	**Total credit hours required to award the degree**	140 Credit Hours
3	**Number of years needed for completion of the program:**	4 Years [8 Academic semesters]
4	**The body responsible for granting the degree:**	21 September University of Medical and Applied Sciences
5	**The body responsible for the program:**	**Department** of Cyber security
6	**Award granted on completion of the program:**	**Bachelor of Science in Cyber security and digital forensics**
7	**Study system:**	Regular attendance (Semester based System)
8	**Study Language of the Program:**	English
9	**Entry requirements:**	Secondary School Certificate (Scientific)
10	**Departments participating in the program:**	Department of Information Technology
11	**Starting year of the program:**	2025/2026
12	**Study methods in the program:**	Full time
13	**Location of Delivery:**	Faculty of Medical Technology 21 UMAS University Campus
14	**The program resources:**	21 September University of Medical and Applied Sciences
15	**Minimum grade requirements:**	Following the Admission Rules made by Ministry of Higher Education and Scientific Research- Republic of Yemen.
16	**Other admission requirements:**	21 UMAS Admission and Regulations Rules.
17	**Date of current development of the program:**	Mar 2025
18	**Prepared by:**	1. Dr. Abdulrahman Mohemmed Obaid 2. Dr. Jameel Saad Hamzah 3. Dr. Awadh Ali Abdo Mohammed
19	**Program coordinator:**	Dr. Hamzah Ali AbdulRahman Qasem

4. Introduction:

The Bachelor's Program in Cyber security and digital forensics is designed to qualify human cadres with the aim of deterring such cyber attacks and protecting cyberspace. This program focuses on

Program Specification Document

teaching basic and advanced knowledge in prevention, detection, response, and recovery from incidents and cyber attacks. Using an interdisciplinary approach, the program aims to provide students with a broad analytical framework for assessing and solving cybersecurity problems.

The skills you'll gain on this course will be in high demand in tomorrow's world. The cyber security sector is facing a significant skills gap at a time when threats and the legal and commercial consequences of inadequate security are increasing. Emerging areas such as the Internet of Things and Smart Cities offer new opportunities for us all, but also new vulnerabilities to accidental or malicious actions.

Cyber security and digital forensics is a computing-based discipline involving technology, people, information, and processes to enable assured operations in the context of adversaries. It draws from the foundational fields of information security and information assurance; and began with more narrowly focused field of computer security.

Promising Jobs:

1- Security engineer
2- Secure system architect
3- Security consultant
4- Security research assistant
5- Data recovery expert
6- Ethical hacker/penetration tester
7- Forensic investigator and consultant
8- Network administrator

5. University Vision, Mission, Values, Objectives, and Goals:

University Vision:

A Contemporary University with National Responsibility and Faith Identity.

University Mission:

Leadership of transformation in managing and providing the health care with all partners via having the distinction standard in education and applied and medical researches that meet the needs of Yemeni people and regional influence.

University Core values:

- Leadership and Influence
- Excellence and Innovation
- Work effectively with a time

University Goals:

1- Ensuring the application of quality standards and having the distinction standards in medical and applied sciences, scientific research and community service.

2- Adopting student-centered learning, the partnership with them for life, consolidating the principles of national responsibility and faith identity, looking after them and developing their capabilities after graduation and during work.

3- Attracting and Eemploying scientists, cadres and talents to gain minds and put an end for the “brain drain” in a way that promotes and ensures the availability of thinkers, businessmen and good citizens.

4- Developing the distinguished academic infrastructure continuously and establishing modern research and service centers with high efficiency that can give a real effect locally and regionally.

5- Enhancing the university status as a preferred partner for local, regional and international partnership through implementing creative styles of education, exchanging researches and knowledge, and providing real and effective outcomes for developing professional practices to benefit from them locally and regionally.

6. Faculty Vision, Mission, Values, and Objectives:

Faculty Vision:

A contemporary medical technology faculty with sober academic dimensions, national responsibility and faith identity.

Faculty Mission:

Participation in leading the medical technological transformation to provide technically and informatically integrated health care, through the provision of scientific educational programs with solid and contemporary academic dimensions, and research services of a creative nature that meet the needs of the Yemeni health sector, its specificity and regional needs.

Faculty Values:

- Forefronting
- Pioneering
- Sobriety

Faculty Objectives:

1- Applying Total Quality Standards, and setting an academic excellence in medical technology sciences, scientific research and community service.

2- Centrality of students in the educational process, their participation, as well as, looking after them, establishing originality values and developing their potential after graduation and during work.

3- Attracting highly scholars cadres, and highly specialized talents in medical technology thus enhances and ensures that there are thinkers, businessmen, and good citizens.

4- Harnessing all available capabilities of infrastructure, academic, training centers, as well as, modern researches and service centers and available educational laboratories to achieve the desired goals of the college of medical technology in order to meet the needs of the labor market.

5- Enhance the university and college position as an ideal partner for the academic and health sectors at the local, regional and international levels by providing educational programs for developing professional practices and useful health-care services.

7. Department Vision, Mission, and Objectives :

Department Vision:

To provide innovative cybersecurity and digital forensics solutions with academic excellence, national responsibility, and faith-driven values.

Department Mission:

To lead in cybersecurity and digital forensics by providing cutting-edge education, fostering research, and offering innovative solutions that meet the evolving needs of the Yemeni digital sector and the region.

Department Objectives:

1- Implementing quality standards in cybersecurity and digital forensics education, research, and community service.
2- Adopting student-centered learning, nurturing national responsibility, and enhancing students' skills post-graduation.
3- Attracting skilled professionals to reduce brain drain, fostering innovation and national development in the cybersecurity sector.
4- Continuously developing state-of-the-art academic and research infrastructure, ensuring real-world impact locally and regionally.
5- Strengthening the department's role as a key partner in local, regional, and international collaborations, offering cutting-edge cybersecurity and digital forensics education and research to meet market needs.

8. CyberSecurity Program Mission and Objectives:

Program Mission:

To equip students with the knowledge and skills necessary to drive digital security advancements, supporting digital transformation through applied education and research that aligns with the technological needs of Yemen and the region.

Program Objectives:

PEO1. Achieving academic excellence in cybersecurity and digital forensics through quality standards, research, and service.

PEO2. Engaging students in the learning process, fostering national responsibility, and supporting their professional growth.

PEO3. Attracting highly qualified faculty and experts in cybersecurity to enhance the program and meet national and regional needs.

PEO4. Leveraging modern infrastructure, research centers, and training facilities to provide practical and relevant cybersecurity education.

PEO5. Strengthening the program's role in advancing professional practices and offering impactful solutions to the cybersecurity challenges faced locally and regionally.

Annex- 1, Survey on the Strategic Orientations of the Department and Similar Departments, and their Alignment to the Strategic Orientations of the University and Faculty.

9. Program Standards & Benchmarks:

Academic Standards:

1. Since, there are no specific advance standards such as (ACM, IEEE or ABET) for cybersecurity program. Therefore, some points have been taken from NARS for computing, Yemen, First Edition, Council for Accreditation & Quality Assurance, Yemen, May 2018, such as for graduate attributes and teaching strategies because of some similarities

Governmental Rules and Regulations:

1. Act No. 13/2005 of the Law of state universities, higher institutes and colleges, Yemen.
2. The executive regulations of Act No. 13/2005 of the Law of state universities, higher institutes and colleges, Yemen.
3. 21 September University of Medical and Applied Sciences (21 UMAS) Rules and Regulations..

Annex- 2, Academic Standards Curriculum Criteria of Accreditation Board

Annex- 3, Unified Regulations for Student Affairs, Ministry of Higher Education and Scientific Research

Benchmarked Programs*:

1. BSc(Hons.) Cyber security, Depatment of Compter Science, Princess Sumaya University for Technology (PSUT), Jordan

كلية الملك الحسين لعلوم الحوسبة-بكالوريوس الأمن السيبراني

2. BSc, Cyber security, Department of Information Systems, Bahrain University, Bahrain

https://cit.uob.edu.bh/undergraduate/b-sc-in-cybersecurity/

3. BSc(Hons.) Cyber security, School of computing, Plymouth University, UK

https://www.plymouth.ac.uk/courses/undergraduate/bsc-cyber-security

4. BS, Cyber security, School of computer science and mathematics, University of Central Missouri, USA

https://www.ucmo.edu/college-of-health-science-and-technology/school-of-computer-science-and-mathematics/cybersecurity/

5. BSc, Cyber security, Department of Computer Science, Cosmats University, Pakistan

http://ww3.comsats.edu.pk/cs/bscy.aspx

6. BSc, Cyber security, School of Science, Edith Cowan University, Australia

https://www.ecu.edu.au/degrees/courses/bachelor-of-science-cyber-security

* There is no any information found about national program of Cyber security

10. Graduate Attributes:

After successfully completing the program, the graduate should be able to:

1- Apply mathematics foundation, programming fundamentals and cybersecurity knowledge and skills to get solutions of complex discipline-related problems.

2- Identify and analyze Computing problems using computational approaches, methods, tools and techniques.

3- Analyze, design, implement, evaluate, and manage computing-based solutions to computing problems in the context of cybersecurity discipline to meet the users and organizations goals and objectives.

4- Develop and use effective interpersonal skills to work effectively as an individual as well as any other role within the team to perform a required task in variety of professional contexts.

5- Use efficiently project management, leadership, communication, interpersonal relationship and life-long learning skills.

6- Communicate effectively the cyber security concepts within a professional context.

7- Demonstrate commitment to ethical, legal, security, political, and social responsibilities and issues as professionals in cybersecurity practice.

8- Demonstrate interest to commence postgraduate studies in cybersecurity and related fields.

11. Program Intended Learning Outcomes (PILOs):

A. Knowledge and Understanding:

Upon successful completion of the Program, graduates should be able to:

A1. Demonstrate an in-depth knowledge of terminology, concepts, methods, principles and theories relaed to the field of cyber security.

A2. Demonstrate a profound knowledge of computing tools, techniques, and methods for solving computing problems related to cybersecurity.

A3. Identify the user and organizational needs and issues involved in the management and security of digital information and computer technology, and the development and maintenance of secure information system.

A4. Exhibit a sound understanding of the concepts related to analysis and design, implementation and evaluation of secured computer-based systems.

B. Cognitive/ Intellectual Skills:

Upon successful completion of the program, graduates should be able to:

B1. Critically analyze complex computing problems using the basic concepts, principles, analytical and mathematical models, algorithms and software tools in the context of cybersecurity.

B2. Propose appropriate cybersecurity solutions and integrate them effectively into the user and organization environment.

B3. Select an appropriate range of tools and technologies to plan, organize, and implement a cyber security project considering human factors, user and organisational requirements.

B4. Evaluate a computing-based solution to meet a given set of computing requirements in the context of cybersecurity discipline.

C. Practical and Professional Skills:

Upon successful completion of the program, graduates should be able to:

C1. Apply mathematical foundations, algorithmic principles, cryptography, design and development principles, and computing theory in the modeling and design of secured computer-based systems.

C2. Implement and test a computing-based solution to meet a given set of computing requirements in the context of cyber security.

C3. Use effectively cybersecurity standard framework, tools and techniques for the construction, testing and implementation of secure computer applications of varying complexity.

C4. Apply principles, processes, modern tools and techniques to implement and manage a secure information system, mitigating security risks and responding to security incidents.

D. General and Transferable Skills:

Upon successful completion of the program, graduates should be able to:

D1. Function effectively individually, as a member, or leader of a team engaged in activities appropriate to the cybersecurity program's discipline to accomplish a common goal.

D2. Commit to professional ethics, responsibilities, and norms of professional cybersecurity practices.

D3. Communicate effectively in writing and verbally to wide range of audiences in cybersecurity Practices.

D4. Engage in continuing professional development and lifelong learning as a computing professional.

Annex- 4, Survey of Similar Accredited Programs at National and International Universities (Benchmarks))

Annex- 5, Survey on Mission and Objectives of the Program and Similar Accredited Programs and its Alignment to the University, Faculty, and Department Missions and
Annex- 6, Alignment of Program Intended Learning Outcomes (PILOs) to the Faculty Objective
Annex- 8, Alignment of Program Intended Learning Outcomes (PILOS) to Program Objectives (POs)
Annex- 9, Mapping of Program Objectives to the Faculty Mission
Annex- 10, Mapping Program Objectives to the Department Mission
Annex- 11, Mapping of Program Objectives (POs) to the Department Objectives
Annex- 12, Survey of PILOs for Similar Accredited Programs at National and International

Universities.

12. Teaching and Learning Strategies:

- Lectures/ Interactive lectures,
- Tutorials,
- Discussion/Interactive Class Discussions,
- Illustrations,
- Brainstorming,
- Videos Demonstrations,
- Seminar/ Project/ Presentation
- Case studies,
- Exercises and Homeworks,
- Laboratory/Practical Experiments-based Session /Simulations
- Computer Laboratory-based Sessions,
- Workshops Practices,
- Directed Self-Study,
- Problem Based Learning,
- Team work (Cooperative Learning),
- Field Visits/Training,
- Online Activities
- Minor/Major Project

Teaching Strategy	Description
Lectures/ Interactive Lectures	These are lecture/interactive lectures weekly conducted in the class and supported with variety of teaching formats including, lectures and multimedia presentations, use of whiteboard to solve examples and illustrating different tasks and problems introduced by the presentation, and class discussions, in which concepts, approaches, and case studies are presented, explored, and shown students what they need to know.
Problem Solving	This allows students to become more active in their learning as they work out which information they need to find out how to solve a particular problem.
Tutorials	Tutorial classes are provided to create a stimulating environment for students to work through examples, exercises and case studies. Tutorials include worksheets of carefully-designed questions that make students to think about challenging subjects. They are designed to be used after a brief lecture in which students work in pairs or groups.
Seminar/ Project/Presentation	In each course, different projects which cover a variety tasks in the course will be prepared by the teacher and assigned to different student's groups. Moreover, the teacher needs to set advance work for a selected number of

Teaching Strategy	Description
	students, and then have the selected students present their work to the whole group, for discussion, criticism and suggestions for improvement. Seminar sessions and presentations provide an opportunity to address questions, queries and problems.
Team work (Cooperative Learning)	Group learning involves a large or small group activity that encourages students to focus on a topic and contribute to the overall project. Students then learn practically the team work skills such as dividing the tasks, leading or working with team members, planning, sharing knowledge clearly, time scheduling, searching, reporting, presenting, and resources management, etc.
Laboratory/Practical Experiments based Sessions/ Simulations	During laboratory sessions, students will be given experiments to work in groups where they can apply and verify the theories and principles gained. This provides them the opportunity to have hands-on experience to design and conduct experiments in addition to analyzing, interpreting resulted data obtained from experiments, and maximize their learning through actual simulation
Interactive Class Discussions	Interactive class discussions are carried out about some aspects, related to the subject. It involves a large or small group activity that encourages students to focus on a topic and contribute to the free flow of ideas. The teacher may begin a brainstorming session by posing a question or a problem, or by introducing a topic. Students then express possible answers, relevant words and ideas
Directed Self-Study	Students are encouraged to undertake independent study to both supplement and consolidate what are being learned.
Exercises and Home Works	Students are given special tasks, exercises, puzzles, and activities during the class or at homes. Students are exposed to and use many skills throughout this strategy such as developing their way of thinking and solving exercises and puzzles, cognition, and use of different searching strategies.
Field Visits/ Training	The students are assigned to perform a site visit to acquire field related information.
Illustrations	Illustrations performing an activity so that learners can observe how it is done in order to help prepare learner to transfer theory to practical application. Moreover, this strategy involves the teacher showing learners how to do something
Brainstorming	It is a process for generating multiple ideas/options in which judgment is suspended until a maximum number of ideas has been generated. It is a common teaching approach that is often used by organizing a meeting of a group of students in a round circle, so that students combined focus their thinking on solving a problem in creative ways, and this strategy is usually followed in educational meetings and work sessions to stimulate students, their thinking and discussion.

Teaching Strategy	Description
Computer Laboratory-based Sessions	Practical Applications using a variety of simulations software before the real design and implementation. A variety of web-based searches students will be assigned to learn how they can search for solutions using the Web.
Problem based Learning	This allows students to become more active in their learning as they work out to select which information they need to find out how to solve a particular problem. They can work out a problem collaboratively, practice research as well as testing different components to come up with a valid solution.
Online Activities	For every unit covered in each course, students will be given opportunities to complete interactive learning activities including discussion forums, quizzes and problem-solving activities through the e-platform.
Minor/Major Project	Minor projects are usually associated with the practical parts of some courses. Major project is the graduation project in which students will apply the theoretical knowledge and practical skills to formulate a project under a supervision of a faculty member.
Case Studies	To be taken in selected subject to be aware regarding the courses.

13. Assessment Methods:

- Written tests (mid and final terms exam)
- Quizzes
- Oral exams,
- Technical/Practical Report
- Project/Practical Lab Sessions/ simulation
- Assignments
- Practical lab performance assessment,
- Coursework activities assessment,
- Home works and assignments,
- Presentations.
- Problem solving.

Assessment Strategy	Description
Written Tests (Mid and Final Terms Exam)	Mid. term & Final exams for each course is required for all courses except Graduation Projects. These exams will evaluate the extent in which the student understanding of theoretical and applied subjects.
Quizzes	Assigning case studies to students is very helpful to assess the extent of understanding the topics.
Presentations	Some points are assigned to multiple choice questions and Quizzes in

Assessment Strategy	Description
	order to asses' student ability to follow the lecturer during the study course. quizzes are related to past as well as topics discussed in the period. This helps students develop self-confidence, readiness, and accuracy in major exams
Technical/Practical Report/Project/Practical Lab Sessions/ Simulation	Assessing students to their ability to write theoretical and lab reports as well as the understanding of organizing the reports. The practical lab sessions are required for some courses. To demonstrate the report writing skills, the use of IT and E-learning and the skills to interpret and report data and draw conclusions
Practical Lab Performance Assessment	To demonstrate the personal skills, practical expertise, communication skills, ability to interpret and report data and draw conclusions, and team work expertise they are expected to be learned and gained through their education.
Coursework Activities Assessment	The entire assessment of coursework activities during the teaching period of each course (which includes group and individual work, tests and presentations, etc.)
Homeworks and Assignments	Assignments are given to students so that they will have the opportunity to use information provided in textbooks, lecturers, and other resources to test students' degree of understanding in the discussed topic. For all courses except for project.
Problem Solving	This allows students to become more active in their learning as they work out which information they need to find out how to solve a particular problem.
Oral Exams	Used For courses like Graduate Project and Engineering Training to knowing the knowledge of the students.

14. Alignment of Program Intended Learning Outcomes (PILOs) to Teaching Strategies and Assessment Methods:

PILOs	Teaching Strategy	Assessment Methods
Knowledge and Understanding (A1, A2, A3, A4)	Lectures/Interactive Lectures, Tutorials, Illustrations, Videos Demonstrations, Presentation/Seminar, Discussion/Interactive Class discussions, Case Studies, Exercises and Home Works, Directed Self- Study, Online Activities	Written tests (Mid and Final Terms Exam), Quizzes, Oral Exams, Homeworks and Assignments, Presentations
Intellectual Skills (B1, B2, B3, B4)	Lectures/ Interactive Lectures, Tutorials,	Written tests (Mid and Final Terms Exam),

PILOs	Teaching Strategy	Assessment Methods
	Brainstorming, Discussion/Interactive Class discussions Seminar/ Project/ Presentation, Case Studies, Practical Experiments based Session, Exercises and Home Works, Directed Self-study, Problem based Learning, Team work/ Cooperative Learning, Field Visits/Training, Online Activities	Quizzes, Oral Exams, Homeworks and Assignments, Presentations, Technical Report, Practical Lab Performance Assessment, Coursework Activities Assessment,
Professional & practical skills (Cl, C2, C3, C4)	Interactive Lectures, Tutorials, Interactive Class Discussions Seminar/ Project/ Presentation, Case Studies, Practical Experiments-based Session, Exercises and Homeworks, Computer laboratory-based Sessions Directed Self-Study, Problem based Learning, Teamwork/ Cooperative Learning, Field Visits/Training, Mini/Major Project. Online Activities	Written tests (Mid and Final Terms Exam), Quizzes, Oral Exams, Homeworks and Assignments, Presentations, Technical/Practical Report, Project/Practical Lab Sessions, Practical Lab Performance Assessment, Coursework Activities Assessment
General & Transferable Skills (D1, D2, D3, D4)	Directed Self-Study, Problem based Learning, Teamwork/ Cooperative Learning, Field Visits/Training, Presentation/Seminar, Case Studies, Exercises and Homeworks	Oral Exams, Presentations Technical/Practical Report

15. Project Assessment:

Each project will be assessed by a committee of three members as follows:

Item	Marks Distribution
Project supervisor	60%
Internal examiner: a member of the department staff.	20%
External examiner: a qualified external examiner (either from other departments of the faculty or from another university)	20%
Total	**100%**

16. Training Course Assessment:

The training course will be assessed through:

Item	Assessment	Mark
Field Training	Weekly Report from the student	2 marks per report (24 marks)
	Training partner reports	20 marks
	Final report from the student	16 marks
	Final Presentation from the students	40 marks
Total		**100%**

17. Intended Learning Outcomes Mapping:

See below Annexes.

Annex- 13, Alignment of Program PILOs with Council of Accreditation and Standards
Annex- 14, Survey of Credit Hours of Similar Programs

18. Program Structure:

No	Requirements		No. of Courses	Credit Hours	Rational Weight %
1	University Requirements	Compulsory	7	14	10.44%
		Elective	0	0	
2	Faculty Requirements	Compulsory	12	36	26.86%
		Elective	0	0	
3	Department Requirements	Compulsory	6	18	12.43%
		Elective	0	0	
4	Program Requirements	Compulsory	22	66	49.25%
		Elective	2	6	
5	Field Training	Compulsory	0	0	00.00%
		Elective	1	0	
	Total:		50	140	100.00%

* The Project Courses Credit Hours are already added to the total credit hours with the faculty requirements.

18.1. University Requirements

Compulsory Courses

No.	Level-Sem.	Course Code	Course Name	اسم المقرر	Cr. Hrs	L	T	P	Prerequisites, Co-requisites
1.	1/1	06.11.701	English 101	اللغة الإنجليزية 101	2	2	0	0	
2.	1/1	06.11.702	Arabic Israeli Conflict	الصراع العربي الإسرائيلي	2	2	0	0	
3.	1/2	06.11.703	English 102	اللغة الإنجليزية 102	2	2	0	0	
4.	1/2	06.11.704	Islamic Culture	الثقافة الإسلامية	2	2	0	0	
5.	1/2	06.11.705	National Culture	الثقافة الوطنية	2	2	0	0	
6.	1/1	06.11.706	Arabic 1	اللغة العربية 101	2	2	0	0	
7.	1/2	06.11.707	Arabic 2	اللغة العربية 102	2	2	0	0	
Total					**14**	**14**	**0**	**0**	

Elective Courses: None

18.2. Faculty Requirements

Compulsory Courses

No.	Level/Sem.	Course Code	Course Name	اسم المقرر	Cr. Hrs.	L	T	P	Prerequisites, Co-requisites
1.	1/1	07.01.701	Fundamentals of Computer	اساسيات الحاسوب	3	2	-	2	
2.	1/1	07.02.703	Physices	فيزياء	3	2	-	2	
3.	1/1	07.02.701	Mathematics1	رياضيات 1	3	2	2	-	
4.	2/1	07.11.702	Programming 1	برمجة 1	3	2	-	2	
5.	2/1	07.12.704	Mathematics 2	رياضيات 2	3	2	2	-	
6.	2/1	05.01.715	Communication Skills and Presentation	مهارات الاتصال والتواصل	2	2	-	-	
7.	1/2	07.11.703	Programming 2	برمجة 2	3	2	-	2	
8.	1/2	07.13.702	Linear Algebra	الجبر الحطي	3	2	2	-	
9.	1/2	07.11. 704	Computer network	شبكات الحاسوب	3	2	-	2	
10.	1/2	07.11. 705	Database Systems	أنظمة قواعد البيانات	3	2	-	2	
11.	1/2	07.11. 707	Computer System Architecture	معمارية الحاسوب	3	2	-	2	
12.	1/2	05.11.709	Probability and Statistics	الاحصاء و احتمالات	3	2	2	-	
13.	2/2	07.11. 708	Object-Oriented Programming	برمجة هدفية موجهة	3	2	-	2	
14.	2/2	07.11. 709`	Operating System	نظم تشغيل	3	2	-	2	
15.	2/2	07.11. 710	System Analysis and Design	تحليل وتصميم نظم	3	2	-	2	
16.	2/2	07.11. 712	Data Structure and Algorithms	هياكل بيانات وخوارزميات	3	2	-	2	
17.	1/3	07.11. 715	Web design and development	تصميم وتطوير الويب	3	2	-	2	
18.	2/3	05.02.720	Research Methodology	مناهج البحث العلمي	2	2	-	-	
19.	1/4	07.11. 724	Mobile Application Development	تطوير تطبيقات الأجهزة المتنقلة	3	2	-	2	
20.	1/4	07.11. 727	Final Project 1	مشروع التخرج 1	3	3	-	-	
21.	2/4	07.11. 728	Final Project 2	مشروع التخرج 2	3	3	-	-	
22.	2/4	07.11. 730	Entrepreneurship	ريادة أعمال	2	2	-	-	
Total					**63**	**46**	**8**	**26**	

Elective Courses: None

18.3. Department Requirements

Elective Courses: None

16.4 Program Major

Compulsory Courses

No.	Level-Sem.	Course Code	Course Name	اسم المقرر	Cr. Hrs.	L	T	P	Prerequisites, Co-requisites
1	2/1	07.14. 701	Introduction to Cybersecurity	مقدمة في الامن السيبراني	3	3	-	-	
2	1/2	07.14. 702	Cryptography Principles	مبادي التشفير	3	2	-	2	
3	2/2	07.14. 703	Information Security	أمن المعلومات	3	2	-	2	
4	2/2	07.14. 702	Risk Management	ادارة المخاطر	3	3	-	-	
5	2/2	07.14. 702	Network Security	أمن الشبكة	3	3	-	-	
6	1/3	07.14. 704	Threats Analysis and Modeling	تحليل التهديدات والنمذجة	3	2	-	2	
7	1/3	07.14. 705	Software Security Development	تطوير أمن البرمجيات	3	2	-	2	
8	1/3	07.14. 706	Access Control and Identity Management	التحكم في الوصول وإدارة الهوية	3	2	-	2	
9	1/3	07.14. 707	Introduction to Digital Forensics	مقدمة في التحقيق الجنائي الرقمي	3	2	-	2	
10	1/3	07.14. 708	Security Strategy and Planning	استراتيجية الأمن والتخطيط	3	3	-	-	
11	2/3	07.14. 709	Information System Security Management	إدارة أمن أنظمة المعلومات	3	3	-	-	
12	2/3	07.14. 710	Ethical Hacking	اختبار الاختراق	3	2	-	2	
13	2/3	07.14. 711	Artificial Intelligence for Cybersecurity	الامن الذكي	3	2	-	2	
14	2/3	07.14. 712	Personal Privacy and Social Engineering	الخصوصية الشخصية والهندسة الاجتماعية	3	3	-	-	
15	2/3	07.14. 713	Digital forensics laws and professional ethics	قوانين الادلة الجنائية الرقمية واخلاقيات المهنة	3	3	-	-	
16	1/4	07.14. 714	Network Forensics	التحقيق الجنائي للشبكات	3	2	-	2	
17	1/4	07.14. 715	Cybersecurity Operations	عمليات الأمن السيبراني	3	3	-	-	
18	2/4	07.14. 717	Mobile Forensics	التحقيق الجنائي للأجهزة المحمولة	3	2	-	2	
19	2/4	07.14. 719	System Components Security and Testing	أمان مكونات النظام واختبارها	3	3	-	-	
Total					**57**	**47**	**0**	**20**	

Elective Courses (6 Cr.Hrs.)									
No.	**Level-Sem.**	**Course Code**	**Course Name**	**اسم المقرر**	**Cr. Hrs.**	**L**	**T**	**P**	**Prerequisites, Co-requisites**
1.	4/2	07.14. 716	Special Topics in Cybersecurity	مواضيع خاصة في الأمن السيبراني	3	3	-	-	
2.	4/2	07.14. 716	Enterprise Security and Governance	أمن وحوكمة المؤسسات	3	3	-	-	
3.	4/2	07.14. 718	Cyber Security Incident Detection and Response	كشف واستجابة حوادث الأمن السيبراني	3	3	-	-	
4.	4/2	07.14. 718	Parallel and Distributed Computing	الحوسبة المتوازية والموزعة	3	3	-	-	
5.	4/2	07.14. 718	Intelligent Threat Detection	كشف التهديدات الذكي	3	3	-	-	
6.	4/2	07.14. 716	Special Topics in Cybersecurity	مواضيع خاصة في الأمن السيبراني	3	3	-	-	
				Total	**6**	6	--	--	

Field Attachments and Training Courses									
No	**Level-Sem.**	**Course Code**	**Course Name**	**اسم المقرر**	**Cr. Hrs.**	**L**	**T**	**P**	**Prerequisites, Co-requisites**
1	Sum	07.14.728	Field Training	**التدريب الميداني**	Pass	-	-	-	After completed 90 Credit Hours
Total									

16.5 Study Plan:

Level 1

Term 1									
No.	**Level-Sem.**	**Course Code**	**Course Name**	**اسم المقرر**	**Cr. Hrs.**	**L**	**T**	**P**	**Prerequisites, Co-requisites**
1.	1/1	06.11.702	Arabic 101	لغة عربية 101	**2**	**2**	**-**	**-**	**-**
2.	1/1	06.11.701	English101	لغة انجليزية 101	**2**	**2**	**-**	**-**	**-**
3.	1/1	06.11.703	Islamic Culture	ثقافة إسلامية	**2**	**2**	**-**	**-**	**-**
4.	1/1	06.11.704	National Culture	ثقافة وطنية	**2**	**2**	**-**	**-**	**-**
5.	1/1	07.01.701	Fundamentals of Computer	اساسيات الحاسوب	**3**	**2**	**-**	**2**	**-**
6.	1/1	07.02.703	Physices	فيزياء	**3**	**2**	**-**	**2**	**-**
7.	1/1	07.02.701	Mathematics1	رياضيات 1	**3**	**2**	**2**	**-**	**-**
Total					**17**	**14**	**2**	**4**	

Term 2									
No.	**Level-Sem.**	**Course Code**	**Course Name**	**اسم المقرر**	**Cr. Hrs.**	**L**	**T**	**P**	**Prerequisites, Co-requisites**
1.	2/1	06.11.706	Arabic 102	لغة عربية 102	**2**	**2**	**-**	**-**	
2.	2/1	06.11.705	English 102	لغة انجليزية 102	**2**	**2**	**-**	**-**	
3.	2/1	06.11.707	Arabic Israeli Conflict	الصراع العربي الإسرائيلي	**2**	**2**	**-**	**-**	
4.	2/1	07.11.702	Programming 1	برمجة 1	**3**	**2**	**-**	**2**	
5.	2/1	07.12.704	Mathematics 2	رياضيات 2	**3**	**2**	**2**	**-**	
6.	2/1	05.01.715	Communication Skills and Presentation	مهارات الاتصال والتواصل	**2**	**2**	**-**	**-**	
7.	2/1	07.14. 701	Introduction to Cybersecurity	مقدمة في الامن السيبراني	**3**	**3**	**-**	**-**	
Total					**17**	**15**	**2**	**2**	

Level 2

Term 1									
No.	**Level-Sem.**	**Course Code**	**Course Name**	**اسم المقرر**	**Cr. Hrs.**	**L**	**T**	**P**	**Prerequisites, Co-requisites**
1.	1/2	07.11.703	Programming 2	برمجة 2	**3**	**2**	**-**	**2**	
2.	1/2	07.13.702	Linear Algebra	الجبر الحطي	**3**	**2**	**2**	**-**	
3.	1/2	07.11. 704	Computer network	شبكات الحاسوب	**3**	**2**	**-**	**2**	
4.	1/2	07.11. 705	Database Systems	أنظمة قواعد البيانات	**3**	**2**	**-**	**2**	
5.	1/2	07.11. 707	Computer System Architecture	معمارية الحاسوب	**3**	**2**	**-**	**2**	
6.	1/2	07.14. 702	Cryptography Principles	مبادي التشفير	**3**	**2**	**-**	**2**	
7.	1/2	05.11.709	Probability and Statistics	الاحصاء و احتمالات	**3**	**2**	**2**	**-**	
Total					**21**	**14**	**4**	**10**	

Term 2									
No.	**Level-Sem.**	**Course Code**	**Course Name**	**اسم المقرر**	**Cr. Hrs.**	**L**	**T**	**P**	**Prerequisites, Co-requisites**
1.	2/2	07.11. 708	Object-Oriented Programming	برمجة هدفية موجهة	**3**	**2**	**-**	**2**	
2.	2/2	07.14. 703	Information Security	أمن المعلومات	**3**	**2**	**-**	**2**	
3.	2/2	07.11. 709`	Operating System	نظم تشغيل	**3**	**2**	**-**	**2**	
4.	2/2	07.11. 710	System Analysis and Design	تحليل وتصميم نظم	**3**	**2**	**-**	**2**	
5.	2/2	07.14. 702	Risk Management	ادارة المخاطر	**3**	**3**	**-**	**-**	
6.	2/2	07.14. 702	Network Security	أمن الشبكة	**3**	**3**	**-**	**-**	
7.	2/2	07.11. 712	Data Structure and Algorithms	هياكل بيانات وخوارزميات	**3**	**2**	**-**	**2**	
Total					**21**	**16**	**0**	**10**	

Level 3

Term 1									
No.	**Level-Sem.**	**Course Code**	**Course Name**	**اسم المقرر**	**Cr. Hrs.**	**L**	**T**	**P**	**Prerequisites, Co-requisites**
1.	1/3	07.14. 704	Threats Analysis and Modeling	تحليل التهديدات والنمذجة	**3**	**2**	**-**	**2**	
2.	1/3	07.11. 715	Web design and development	تصميم وتطوير الويب	**3**	**2**	**-**	**2**	
3.	1/3	07.14. 705	Software Security Development	تطوير أمن البرمجيات	**3**	**2**	**-**	**2**	
4.	1/3	07.14. 706	Access Control and Identity Management	التحكم في الوصول وإدارة الهوية	**3**	**2**	**-**	**2**	
5.	1/3	07.14. 707	Introduction to Digital Forensics	مقدمة في التحقيق الجنائي الرقمي	**3**	**2**	**-**	**2**	
6.	1/3	07.14. 708	Security Strategy and Planning	استراتيجية الأمن والتخطيط	**3**	**3**	**-**	**-**	
Total					**18**	**13**	**0**	**10**	

Term 2									
No.	**Level-Sem.**	**Course Code**	**Course Name**	**اسم المقرر**	**Cr. Hrs.**	**L**	**T**	**P**	**Prerequisites, Co-requisites**
1.	2/3	07.14. 709	Information System Security Management	إدارة أمن أنظمة المعلومات	**3**	**3**	**-**	**-**	
2.	2/3	07.14. 710	Ethical Hacking	اختبار الاختراق	**3**	**2**	**-**	**2**	
3.	2/3	05.02.720	Research Methodology	مناهج البحث العلمي	**2**	**2**	**-**	**-**	
4.	2/3	07.14. 711	Artificial Intelligence for Cybersecurity	الامن الذكي	**3**	**2**	**-**	**2**	
5.	2/3	07.14. 712	Personal Privacy and Social Engineering	الخصوصية الشخصية والهندسة الاجتماعية	**3**	**3**	**-**	**-**	
6.	2/3	07.14. 713	Digital forensics laws and professional ethics	قوانين الادلة الجنائية الرقمية واخلاقيات المهنة	**3**	**3**	**-**	**-**	
Total					**17**	**15**	**0**	**4**	

Level 4

Term 1									
No.	**Level-Sem.**	**Course Code**	**Course Name**	**اسم المقرر**	**Cr. Hrs.**	**L**	**T**	**P**	**Prerequisites, Co-requisites**
1.	1/4	07.11. 724	Mobile Application Development	تطوير تطبيقات الأجهزة المتنقلة	**3**	**2**	**-**	**2**	
2.	1/4	07.14. 714	Network Forensics	التحقيق الجنائي للشبكات	**3**	**2**	**-**	**2**	
3.	1/4	07.14. 715	Cybersecurity Operations	عمليات الأمن السيبراني	**3**	**3**	**-**	**-**	
4.	1/4	07.14. 716	Elective 1	مقرر اختياري 1	**3**	**3**	**-**	**-**	
5.	1/4	07.11. 727	Final Project 1	مشروع التخرج 1	**3**	**3**	**-**	**-**	
Total					**15**	**13**	**0**	**4**	

Term 2									
No.	**Level-Sem.**	**Course Code**	**Course Name**	**اسم المقرر**	**Cr. Hrs.**	**L**	**T**	**P**	**Prerequisites, Co-requisites**
1.	2/4	07.11. 728	Final Project 2	مشروع التخرج 2	**3**	**3**	**-**	**-**	
2.	2/4	07.14. 717	Mobile Forensics	التحقيق الجنائي للأجهزة المحمولة	**3**	**2**	**-**	**2**	
3.	2/4	07.14. 718	Elective 2	مقرر اختياري 2	**3**	**3**	**-**	**-**	
4.	2/4	07.14. 719	System Components Security and Testing	أمان مكونات النظام واختبارها	**3**	**3**	**-**	**-**	
5.	2/4	07.11. 730	Entrepreneurship	ريادة أعمال	**2**	**2**	**-**	**-**	
Total					**14**	**13**	**0**	**2**	

16.6 Distribution of Total Credit Hours:

Level	Term	University Requirements		Faculty Requirements		Department Requirements		Program Requirements		Program Elctives		Training		Project		Total Cr. Hrs.		Total Cr. Hrs./ Level
		No. of Courses	Credit Hours	No. of Courses	Credit Hours	No. of Courses	Credit Hours	No. of Courses	Credit Hours	No. of Courses	Credit Hours	No. of Courses	Credit Hours	No. of Courses	Credit Hours	No. of Courses	Credit Hours	
First	First	3	6	2	6	3	9	1	3			-	-	-	-	9	24	30%
	Second	4	8	3	9	2	6	0	0			-	-	-	-	9	23	
Second	First	-		0	0	1	3	4	12			-	-	-	-	7	19	27%
	Second	-		1	3	-		3	9			-	-	-	-	6	16	
Third	First	-		2	6	-		5	15			-	-	-	-	7	18	27%
	Second	-		2	6	-	-	5	15			1	0	-	-	6	18	
Fourth	First	-		-	-	-	-	4	12			-	-	1	3	4	12	16%
	Second	-		-	-	-	-	0	0	2	6	-	-	1	3	4	9	
Total:		7	14	10	30	6	18	22	66	2	6	--	--	2	6	47	100%	
Percentage:		13%		22%		13%		43%		4.5%		0%		4.5%		100.00%		

Annex- 15, Survey of Number of Courses and Credit Hours of Similar Programs

Annex- 16, Themes of Courses of Study and their Weightage

Annex- 17, Coding System

Annex- 18, Survey of Course Names per Academic Semesters of Similar Program

Annex- 19, Comparison of Program Courses and Similar Programs Courses

Annex- 20, Matrix of Mapping Program PILO's with Courses

16.7 Admission Requirements:

1. Admissions to the program shall be made as per the admission rules set by the Ministry of Higher Education and Scientific Research as well as IUTT admission guidelines.
2. General Secondary school certificate (Science Section) or any equivalent certificate with grade as specified in the admission rules made by Ministry of Higher Education and Scientific Research.
3. Pass the aptitude test and personal interview if any.
4. Any necessary requirement for specialization, decided by the Faculty.

16.8 Attendance and Graduation Requirements:

1. Student attendance should not be less than 75%.
2. Student will graduate after successfully passing all program requirements.
3. Total credit hours for the program are **140** credit hours**.**
4. Minimum score for any student to pass any credit hours course is 50% marks.

16.9 Grading System:

From 90% to 100% of total marks	Excellent
From 80% to less than 90%	Very Good
From 65% to less than 80%	Good
From 50% to less than 65%	Pass
Less than 50%	Poor/Fail

16.10 Facilities Required for Running the Program:

1. Sufficient Classrooms furnished with all necessary pieces and equipment.
2. Drawing halls.
3. Library and study room
4. Computer Labs.
5. Audio Studio.
6. Photography and Video Studio.
7. Academic and administrative staff offices.
8. Internet.

16.11 Program Assessment:

	Type of the Sample who Assess the program	Instruments used	Sample
1	**Graduates**	**Questionnaire**	20%
2	**Academic Staff**	**Interviews**	100%
3	**Employment agencies (views)**	**Questionnaires**	50%
4	**Final year students**	**Focus group discussions**	20%
5	**External Examiners**	**Interviews**	100%
6	**Others CAQA**	**Interviews/ Documents analysis**	100%

16.12 Program Quality Standards:

16.13 Internal and external training to satisfy program standards:

16.14 Program Policies:

Based on University Regulations

1.	**(Class Attendance):** A student should attend not less than 75 % of total hours of the subject; otherwise, he/she will not be able to take the exam and will be considered as exam failure. If the student is absent due to illness, he/she should bring a proof statement from university Clinic. If the absent is more than 25% of a course total contact hour, student will be required to retake the entire course again.
2.	**(Tardy) :** For late in attending the class, the student will be initially notified. If he repeated lateness in attending class, he/she will be considered as absent.
3.	**(Exam Attendance/Punctuality) :** A student should attend the exam on time. He/she is permitted to attend an exam half one hour from exam beginning, after that he/she will not be permitted to take the exam and he/she will be considered as absent in exam.
4.	**(Assignments & Projects) :** Assignments and projects are given as per course specification; the student has to submit all the assignments for checking on time, mostly one week after given the assignment.
5.	**(Cheating) :** For cheating in exam, a student will be considered as fail. In case the cheating is repeated three times during his/her study the student will be disengaged from the Faculty.
6.	**(Plagiarism) :** Plagiarism is the attending of a student the exam of a course instead of another student. If the examination committee proofed a plagiarism of a student, he/she will be disengaged from the Faculty. The final disengagement of the student from the Faculty should be confirmed from the Student Council Affair of the university or according to the university roles.
7.	**(Other policies) :** - Mobile phones are not allowed to use during a class lecture. It must be closed; otherwise the student will be asked to leave the lecture room. - Mobile phones are not allowed in class during the examination. - Lecture notes and assignments might be given directly to students using soft or hard copy.

Annex- 1, Survey on the Strategic Orientations of the Department and Similar Departments, and their Alignment to the Strategic Orientations of the University and Faculty:

Benchmarked Programs:

1. BSc(Hons.) Cyber security, Depatment of Compter Science, Princess Sumaya University for Technology (PSUT), Jordan
   كلية الملك الحسين لعلوم الحوسبة-بكالوريوس الأمن السيبراني
2. BSc, Cyber security, Department of Information Systems, Bahrain University, Bahrain
   https://cit.uob.edu.bh/undergraduate/b-sc-in-cybersecurity/
3. BSc(Hons.) Cyber security, School of computing, Plymouth University, UK
   https://www.plymouth.ac.uk/courses/undergraduate/bsc-cyber-security
4. BS, Cyber security, School of computer science and mathematics, University of Central Missouri, USA
   https://www.ucmo.edu/college-of-health-science-and-technology/school-of-computer-science-and-mathematics/cybersecurity/
5. BSc, Cyber security, Department of Computer Science, Cosmats University, Pakistan
   http://ww3.comsats.edu.pk/cs/bscy.aspx
6. BSc, Cyber security, School of Science, Edith Cowan University, Australia
   https://www.ecu.edu.au/degrees/courses/bachelor-of-science-cyber-security
7. BSc(Hons.) Cyber security and digital forensics, Department of Cyber security, 21 UMAS, Yemen.

1- Vision of the Corresponding Departments and Suggested Vision:

#	The Department	Vision
1.	**Department of Computer Science**	Academic leadership and distinction in computing sciences contributing to the development of the knowledge society locally and regionally
2.	**Department of Information Systems**	-
3.	**School of Computing**	-
4.	**School of Computer Science and Mathematics**	-
5.	**Department of Computer Science**	To excel in the quality of education service, scientific research, and community service, in the field of cybersecurity and networks in accordance with quality standards and academic accreditation.
6.	**School of Science**	Increase student participation rates in STEM and foster their aspiration for Higher Education.
7.	**Department of Cyber security, 21 UMAS**	To provide innovative cybersecurity and digital forensics solutions with academic excellence, national responsibility, and faith-driven values.

2- Mapping of Department Vision to the University and Faculty Visions:

University Vision	Faculty of Medical Technology Vision	Department of Cyber security Vision
A Contemporary University with National Responsibility and Faith Identity.	A contemporary medical technology faculty with sober academic dimensions, national responsibility and faith identity.	To provide innovative cybersecurity and digital forensics solutions with academic excellence, national responsibility, and faith-driven values.

3- Mission of the Corresponding Departments and Suggested Mission:

#	The Department	Mission
1.	**Department of Computer Science**	To qualify highly skilled graduates who can compete and produce creative work in the field of computing sciences. That is achieved through providing a distinguishable learning system that complies with international standards and establishing an environment that encourages learning and creativity, as well as the best utilization of technology and active local and regional partnerships in order to contribute to the development of the knowledge society and achievement of national goals.
2.	**Department of Information Systems**	The program is primarily aimed to fill the gap in the critical field of cybersecurity and information security at local and global level. It contributes directly to The Kingdom of Bahrain Economic Development Board by promoting Bahrain's growing Cybersecurity's hub potential.
3.	**School of Computing**	-
4.	**School of Computer Science and Mathematics**	-

Annex- 1, Survey on the Strategic Orientations of the Department and Similar Departments, and their Alignment to the Strategic Orientations of the Universi and Faculty:

#	The Department	Mission
5.	**Department of Computer Science**	Providing a distinguished service in education and scientific research in the field of cybersecurity and networks, in accordance with the standards of academic accreditation, in order to prepare graduates with high scientific and professional competitive capabilities to cover the needs of the labor market and community service.
6.	**Department of Science**	advance students' knowledge of, and aspirations for careers in the science field.
7.	**Department of Cyber security, 21 UMAS**	To lead in cybersecurity and digital forensics by providing cutting-edge education, fostering research, and offering innovative solutions that meet the evolving needs of the Yemeni digital sector and the region.

4- Mapping of Department Mission to the University and Faculty Missions:

University Mission	Faculty of Medical Technology Mission	Department of Cyber security Mission
Leadership of transformation in managing and providing the health care with all partners via having the distinction standard in education and applied and medical researches that meet the needs of Yemeni people and regional influence.	Participation in leading the medical technological transformation to provide technically and informatically integrated health care, through the provision of scientific educational programs with solid and contemporary academic dimensions, and research services of a creative nature that meet the needs of the Yemeni health sector, its specificity and regional needs.	To lead in cybersecurity and digital forensics by providing cutting-edge education, fostering research, and offering innovative solutions that meet the evolving needs of the Yemeni digital sector and the region.

5- Objectives (Educational) of the Corresponding Departments and Suggested Objectives:

#	The Department	Objectives
1.	**Department of Computer Science**	• Continuous excellence in teaching and learning improvement • Develop and improve highly qualified teaching faculty and administrative staff • Develop competitive capabilities of the graduates • Encourage high quality scientific research • Apply the standards of quality assurance and acquire academic accreditation • Participate in community service and create partnerships locally and internationally
2.	**Department of Information System**	• Pursue a successful career in the fields of Cybersecurity in the public or private sectors or embark on an entrepreneurial path. • Add valued contributions to the society through responsible and ethical practice within the Cybersecurity profession. • Engage in life-long learning, professional development, graduate-level studies, adapt to the changes in the work environment, and attain leadership competencies.
3.	**School of Computing**	-
4.	**School of Computer Science and Mathematics**	▪ The School will promote education and research in cybersecurity and information assurance at UCM. ▪ The School will foster sound internal practices for security of computer networks at UCM. ▪ The School will promote collaboration with companies in the region.

Annex- 1, Survey on the Strategic Orientations of the Department and Similar Departments, and their Alignment to the Strategic Orientations of the Universi and Faculty:

#	The Department	Objectives
		▪ The School will promote collaboration with local and state government to provide cybersecurity and information assurance solutions
5.	**Department of Computer Science**	• Providing students with knowledge and skills to qualify them to compete in the labor market. • Enable students to use scientific methods and modern knowledge to solve real problems. • Foster teamwork, co-working opportunities, leadership, excellence, productivity and self-education.
6.	**School of Science**	-
7.	**Department of Cyber security, 21 UMAS**	1- Implementing quality standards in cybersecurity and digital forensics education, research, and community service. 2- Adopting student-centered learning, nurturing national responsibility, and enhancing students' skills post-graduation. 3- Attracting skilled professionals to reduce brain drain, fostering innovation and national development in the cybersecurity sector. 4- Continuously developing state-of-the-art academic and research infrastructure, ensuring real-world impact locally and regionally. 5- Strengthening the department's role as a key partner in local, regional, and international collaborations, offering cutting-edge cybersecurity and digital forensics education and research to meet market needs.

6- Mapping of Department Objectives to the University and Faculty Objectives:

Annex- 1, Survey on the Strategic Orientations of the Department and Similar Departments, and their Alignment to the Strategic Orientations of the Universi and Faculty:

University Objectives	Faculty of Medical Technology Objectives	Department of Cyber security Objectives
1- Ensuring the application of quality standards and having the distinction standards in medical and applied sciences, scientific research and community service. 2- Adopting student-centered learning, the partnership with them for life, consolidating the principles of national responsibility and faith identity, looking after them and developing their capabilities after graduation and during work. 3- Attracting and Eemploying scientists, cadres and talents to gain minds and put an end for the "brain drain" in a way that promotes and ensures the availability of thinkers, businessmen and good citizens. 4- Developing the distinguished academic infrastructure continuously and establishing modern research and service centers with high efficiency that can give a real effect locally and regionally. 5- Enhancing the university status as a preferred partner for local, regional and international partnership through implementing creative styles of education, exchanging researches and knowledge, and providing real and effective outcomes for developing professional practices to benefit from them locally and regionally.	1- Applying Total Quality Standards, and setting an academic excellence in medical technology sciences, scientific research and community service. 2- Centrality of students in the educational process, their participation, as well as, looking after them, establishing originality values and developing their potential after graduation and during work. 3- Attracting highly scholars cadres, and highly specialized talents in medical technology thus enhances and ensures that there are thinkers, businessmen, and good citizens. 4- Harnessing all available capabilities of infrastructure, academic, training centers, as well as, modern researches and service centers and available educational laboratories to achieve the desired goals of the college of medical technology in order to meet the needs of the labor market. 5- Enhance the university and college position as an ideal partner for the academic and health sectors at the local, regional and international levels by providing educational programs for developing professional practices and useful health-care services.	1- Implementing quality standards in cybersecurity and digital forensics education, research, and community service. 2- Adopting student-centered learning, nurturing national responsibility, and enhancing students' skills post-graduation. 3- Attracting skilled professionals to reduce brain drain, fostering innovation and national development in the cybersecurity sector. 4- Continuously developing state-of-the-art academic and research infrastructure, ensuring real-world impact locally and regionally. 5- Strengthening the department's role as a key partner in local, regional, and international collaborations, offering cutting-edge cybersecurity and digital forensics education and research to meet market needs.

Annex- 1, Survey on the Strategic Orientations of the Department and Similar Departments, and their Alignment to the Strategic Orientations of the Universi and Faculty:

Annex- 2, Academic Standards Curriculum Criteria of Accreditation Board

Council for Accreditation & Quality Assurance

ACCREDITATION BOARD FOR ENFINEERING AND TECHNOLOGY (ABET)

CRITERIA FOR ACCREDITING ENGINEERING PROGRAMS 2019-2020 (CyberSecurity)

National Academic Reference Standards (NARS) For Undergraduate Computing Programs

First Edition

Council for Accreditation & Quality Assurance, Yemen
May 2018

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Annex- 3, Unified Regulations for Student Affairs, Ministry of Higher Education and Scientific Research

Attached Separately

Annex- 4, Survey of Similar Accredited Programs at National and International Universities (Benchmarks)

Program No.	The Academic Program	The University	Website	The Faculty	The Department	The Country	Degree Award at Program Completion	Program Accrediting Body	Year of Accreditation	Study Duration
Current Program	B.Sc. in (Hons) Cyber security and digital forensics	21 UMAS		Medical Technology	Cyber security	Yemen	BSc (Hons.)	-	-	4 Yrs
The 1st Program	Cyber Security	Princess Sumaya University for Technology (PSUT)	https://psut.edu.jo/	King Hussein School of Computing Sciences	Computer Science	Jordan	BSc	Jordanian Accreditation and Quality Assurance Commission for Higher Education Institutions (AQACHEI)	-	4 Yrs
The 2nd Program	Cyber Security	University of Bahrain	https://uob.edu.bh/	College of Information Technology	Information Systems	Bahrain	BSc	Higher Education Council	-	4 Yrs
The 3rd Program	Cyber Security	Plymouth University	https://www.plymouth.ac.uk/	School of Engineering, Computing and Mathematics	Computing	UK	BSc	British Computer Society (BCS)	2020	3 Yrs
The 4th Program	Cyber Security	University of Central Missouri	https://www.ucmo.edu/index.php	College of Health, Science and Technology	School of Computer Science and Mathematics	USA	BSc	ABET	2016	4 Yrs
The 5th Program	Cyber security	Cosmats University	https://comsats.edu.pk/	Information Science & Technology	Computer Science	Pakistan (Islamabd)	BSc	National Computing Education Accreditation Council	2020	4 Yrs
The 6th Program	Cyber security	Edith Cowan University	https://www.ecu.edu.au/	School of Science	-	Australia	BSc	Australian Computer Society (ACS)	2014	3 Yrs

* National Academic Reference Standards (NARS) * Tohe National Architectural Accrediting Board (NAAB) * National Authority of Quality Assurance and Accreditation of Education (QAAE)
* Middle States Commission on Higher Education (MSCHE) * European Credit Transfer and Accumulation System (ECTS)

Annex- 5, Survey on Mission and Objectives of the Program and Similar Accredited Programs and its Alignment to the University, Faculty, and Department Missions and 0bjectives

1- Survey on Mission and Objectives of the Program and Similar Accredited Programs

University	Princess Sumaya University for Technology	University of Bahrain	Plymouth University	Unversity of central Missouri	Cosmats University	Edith Cowan University	21 UMAS
Faculty	King Hussein school of computer sciences	Information Tehnology	Faculty of Science and Engineering	College of Health, Science and Technology	Information Science & Technology	School of Science	Medical Technology
Department	Computer Science	Information Systems	School of Engineering, Computing and Mathematics	School of Computer Science and Mathematics	Computer science	-	Cyber security
Program	B.Sc. in Cyber Security	B.Sc. in Cyber Security	BSc (Hons) Cyber Security	BSc (Hons) Cyber Security	BSc (Hons) Cyber Security	B.Sc. in Cyber Security	B.Sc. in (Hons) Cyber security and digital forensics
Country	Jordan	Bahrain	UK	USA	Pakistan	Australia	Yemen
Program Mission	Preparing cybersecurity professionals in both academic and industrial settings capable of leading, designing and developing various projects in different areas of cybersecurity, by providing a distinguished and	Capablilty of evaluating an organization from end to end by assessing its security needs, then designing security and governance architecture that will satisfy its Cyber Security requirements.		• Provide up-to-date undergraduate and graduate programs which enable students to enrich their knowledge and prepare them for careers in computing profession and/or	• Provide high-quality education in cyber security that prepares students for professional careers and lifelong learning in network security, digital forensics, information security, information	To meet the changing landscape of secure computing, which involves not only computers, but also network enabled devices such as smartphones, tablet devices, and Internet of Things (IoT).	To equip students with the knowledge and skills necessary to drive digital security advancements, supporting digital transformation through applied education and research that aligns

University	Princess Sumaya University for Technology	University of Bahrain	Plymouth University	Unversity of central Missouri	Cosmats University	Edith Cowan University	21 UMAS
	high-quality program that focuses on integrating scientific theories and practical training to develop programs and applications			advanced graduate study; • Provide computer-related service courses to enhance student learning and fulfill the needs of the 21st century workforce; • Support and encourage the professional development of its faculty in areas of service, leadership roles in professional organizations, scholarly research, and grant writing.	assurance, secure software design and development, and vulnerability assessment and reverse engineering.		with the technological needs of Yemen and the region.
Program Objectives (PObj)	**POE1.** Students will acquire the knowledge, skills and attitude	**POE1.** Pursue a successful career in the fields of Cybersecurity in the	**POE1.** To give students with a wide variety of qualifications an	**POE1.** Have established themselves in successful cybersecurity-focused	**POE1. Academic Education:** Completion of an		**POE1.** Achieving academic excellence in

University	Princess Sumaya University for Technology	University of Bahrain	Plymouth University	Unversity of central Missouri	Cosmats University	Edith Cowan University	21 UMAS
	necessary for the analysis of Cybersecurity problems and the subsequent design of appropriate solutions using best practices that will enable them to be distinguished and innovative and to acquire top positions in the job market. **POE2.** Students will apply cutting-edge solutions within a professional, legal and ethical framework and will operate effectively in multidisciplinary teams. **POE3.** Students will practice continued, self-learning to keep their knowledge and skills up to date and to remain abreast of	public or private sectors or embark on an entrepreneurial path. **POE2.** Add valued contributions to the society through responsible and ethical practice within the Cybersecurity profession. **POE3.** Engage in life-long learning, professional development, graduate-level studies, adapt to the changes in the work environment, and attain leadership competencies.	opportunity to realise their potential. **POE2.** To enrich the curriculum content and teaching quality through the professional and/or research expertise of staff and through links to external organisations. **POE3.** To encourage and support students while they develop and apply subjectspecific and generic skills that will facilitate life-long learning and continuing professional development. **POE4.** To produce graduates who can make a significant contribution to their chosen profession.	careers and/or pursuing advanced degrees. **POE2.** Continue to update their professional knowledge and skills to adapt to innovation and change to meet the needs of industry and/or academia. **POE3.** Contribute to the greater good of their communities through professional involvement and service.	accredited program of study designed to prepare graduates as computing professionals **POE2. Knowledge for Solving Computing Problems:** Apply knowledge of computing fundamentals, computing specialization, mathematics & statistics, basic and social sciences, and domain knowledge appropriate for the computing specialization to the abstraction and conceptualization of computing models. **POE3. Problem Analysis**: Identify,		cybersecurity and digital forensics through quality standards, research, and service. **POE2.** Engaging students in the learning process, fostering national responsibility, and supporting their professional growth. **POE3.** Attracting highly qualified faculty and experts in cybersecurity to enhance the program and meet national and regional needs. **POE4.** Leveraging modern infrastructure,

University	Princess Sumaya University for Technology	University of Bahrain	Plymouth University	Unversity of central Missouri	Cosmats University	Edith Cowan University	21 UMAS
	the latest developments in cybersecurity. **POE4.** Students will demonstrate readiness to commence postgraduate studies in cybersecurity and related fields.		**POE5.** To provide an understanding of common algorithms, design patterns and computational models, and to apply these techniques to create high quality computer software and systems. **POE6.** To produce graduates who are technical experts, but who also have an awareness of the business, social, legal and ethical contexts of IT. **POE7.** To encourage exploration and enthusiasm for both the subject of computing and to encourage creativity		formulate, research literature, and solve complex computing problems reaching substantiated conclusions using fundamental and advanced principles o computer sciences, cyber security, mathematics & statistics, basic and social sciences. **POE4. Design/ Development of Solutions:** Design and evaluate solutions for complex computing problems, and design and evaluate cyber security systems, components, or processes that meet specified needs with appropriate		research centers, and training facilities to provide practical and relevant cybersecurity education. **POE5.** Strengthening the program's role in advancing professional practices and offering impactful solutions to the cybersecurity challenges faced locally and regionally

University	Princess Sumaya University for Technology	University of Bahrain	Plymouth University	Unversity of central Missouri	Cosmats University	Edith Cowan University	21 UMAS
					consideration for public health and safety, cultural, societal, and environmental considerations. **POE5. Modern Tool Usage:** Create, select, adapt and apply appropriate computing and cyber security based techniques, resources, and tools to complex computing activities, with an understanding of the limitations. **POE6. Individual and Team Work:** Function effectively as an individual and as a member or leader in diverse teams and in multi-disciplinary settings.		

University	Princess Sumaya University for Technology	University of Bahrain	Plymouth University	Unversity of central Missouri	Cosmats University	Edith Cowan University	21 UMAS
					POE7. Communicatio n: Communicate effectively with the computing community and with society at large about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations, and give and understand clear instructions. **POE8. Computing Professionalism and Society:** Understand and assess societal, health, safety, legal, and cultural issues within local and global contexts, , and the consequential responsibilities		

University	Princess Sumaya University for Technology	University of Bahrain	Plymouth University	Unversity of central Missouri	Cosmats University	Edith Cowan University	21 UMAS
					relevant to professional computing practices **POE9. Ethics:** Understand and commit to professional ethics, responsibilities, and norms of professional **POE10. Life-long Learning**: Recognize the need, and have the ability, to engage in independent learning for continual development as a computing profession.		
Program ILOs	**1.** Ability to analyze complex computational problems and to apply principles of computing and related technologies to specify solutions.	**1.** Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions. **2.** Design, implement, and	1. **Knowledge and understanding:** **1.1.** An ability to recognise the fundamental concepts, principles and theories relating to computing and computer applications as appropriate to the	**1.** Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions. **2.** Design, implement, and evaluate a	.	**1.** Apply comprehensive knowledge of concepts, principles and techniques in the cyber security discipline to both theoretical as well as practical situations.	**Knowledge and understanding** **A1.** Demonstrate an in-depth knowledge of terminology, concepts, methods, principles and

University	Princess Sumaya University for Technology	University of Bahrain	Plymouth University	Unversity of central Missouri	Cosmats University	Edith Cowan University	21 UMAS
	2. Ability to design and implement computing based solutions according to a set of cybersecurity requirements. **3.** Ability to communicate effectively within a multidisciplinary, professional context. **4.** Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles. **5.** Function effectively as a member or leader of a team engaged in activities appropriate to the program's	evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline. **3.** Communicate effectively in a variety of professional contexts. **4.** Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles. **5.** Function effectively as a member or leader of a team engaged in activities appropriate	programme of study. **1.2.** A comprehensive understanding of system design and programming **1.3.** An understanding of the legal, regulatory, professional and ethical responsibilities involved in the exploitation of computer technology. **1.4.** Detailed knowledge and understanding of essential facts, concepts, principles and theories related to information security **2. Cognitive and intellectual skills:** **2.1.** The ability to apply appropriate knowledge and skills to the modelling and design of computer-based system. **2.2.** The skills to recognise and analyse	computing-based solution to meet a given set of computing requirements in the context of the program's discipline. **3.** Communicate effectively in a variety of professional contexts. **4.** Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles. **5.** Function effectively as a member or leader of a team engaged in activities		**2.** Exercise critical thinking and judgement to investigate and solve problems relating to cyber security issues in digital systems and networks. **3.** Apply creative thinking to identify and solve cyber security challenges. **4.** Use digital technologies and cyber security software tools for assessing and evaluating cyber security information. **5.** Apply communication skills to demonstrate independence in design and analysis of cyber security solutions and	theories relaed to the field of cyber security. **A2.** Demonstrate a profound knowledge of computing tools, techniques, and methods for solving the real world computing problems. **A3.** Identify the user and organizational needs and issues involved in the management and security of digital information and computer technology, and the development and maintenance of secure information systems. **A4.** Describe the concepts and

University	Princess Sumaya University for Technology	University of Bahrain	Plymouth University	Unversity of central Missouri	Cosmats University	Edith Cowan University	21 UMAS
	discipline. **6.** Ability to apply principles and practices of security on the environment, device, software and human aspects related to solutions. **7.** Ability to analyze and evaluate systems reliability in risk and threat environments.	to the program's discipline. **6.** Apply security principles and practices to maintain operations in the presence of risks and threats.	criteria and specifications appropriate to specific problems, and plan strategies for their solution. **2.3.** The ability to analyse the extent to which a computer-based system meets the criteria defined for its current use and future development. **2.4.** The capability to deploy appropriate theory, practices and tools for the specification, design, implementation and evaluation of computer-based systems. **2.5.** An awareness of the risks, safety issues, legislation and regulatory requirements when designing/managing an information system.	appropriate to the program's discipline. **6.** Apply security principles and practices to maintain operations in the presence of risks and threats.		presenting documented results. **6.** Incorporate an awareness of cross-cultural issues and demonstrate cultural and indigenous competence in professional practice in the cyber security area. **7.** Work collaboratively in the application of knowledge and skills to identify issues and make decisions relevant to cyber security. **8.** Demonstrate creativity and initiative to generate ideas for planning and implementing independent projects in the cyber security	techniques to achieve authentication, authorization, access control, and data integrity. **Cognitive and intellectual skills:** **B1.** Analyze the basic concepts, principles, analytical and mathematical models, algorithms and software tools in the context of cybersecurity. **B2.** Select an appropriate range of security protocols, tools, and techniques for providing confidentiality, data protection, data integrity, authentication, non-

University	Princess Sumaya University for Technology	University of Bahrain	Plymouth University	Unversity of central Missouri	Cosmats University	Edith Cowan University	21 UMAS
			3. Key and transferable skills: **3.1.** Communicate effectively in writing and verbally **3.2.** Manage resources and time **3.3.** Critique and self-evaluate **3.4.** Work both autonomously and as part of a team when required **3.5.** Discuss and debate problems and issues to learn effectively for the purpose of continuing professional development. **3.6.** Work as a member of a development team **3.7.** Use industry standard tools for collaboration **4. Employment related skills:** **4.1.** Initiative and personal responsibility			discipline.	repudiation, and obfuscation. **B3.** Select an appropriate range of tools and technologies to plan, organize, and implement a cyber security project with due considering human factors, user and organisational requirements. **B4.** Evaluate a computing-based solution to meet a given set of computing requirements in the context of cybersecurity discipline. **Practical skills:** **C1.** Apply

University	Princess Sumaya University for Technology	University of Bahrain	Plymouth University	Unversity of central Missouri	Cosmats University	Edith Cowan University	21 UMAS
			4.2. The ability to work both autonomously and within a team **4.3.** Effective communication and debating skills **4.4.** The ability to make decisions based on incomplete information **4.5.** The educational skills required for deep learning **5. Practical skills:** **5.1.** Specify, design and construct computer-based systems. **5.2.** Effectively deploy the tools used for the construction and documentation of computer applications. **5.3.** Recognise risks or safety aspects that may be involved in the operation of computing and information				mathematical foundations, algorithmic principles, cryptography, design and development principles, and computing theory in the modeling and design of security solutions for software or system architecture. **C2.** Design, implement, and test a computing-based solution to meet a given set of computing requirements in the context of cyber security. **C3.** Deploy effectively computing tools and

University	Princess Sumaya University for Technology	University of Bahrain	Plymouth University	Unversity of central Missouri	Cosmats University	Edith Cowan University	21 UMAS
			systems. **5.4.** Prepare technical reports. **5.5.** Give technical presentations. **5.6.** Use scientific literature effectively. **5.7.** Design and construct complex, robust and secure multi-tier computer systems suitable for a variety of platforms and devices. 6. Accreditation specific learning outcomes in Computing: **6.1.** Knowledge and understanding of commercial and economic context of development **6.2.** Knowledge and understanding of management techniques required to achieve objectives in a computing context				techniques used for the construction and documentation of secure computer applications of varying complexity. **C4.** Apply principles, processes, tools and techniques used in mitigating security threats and responding to security incidents. **General/ Transferrable Skills:** **D1.** Function effectively individually, as a member, or leader of a team engaged in activities appropriate to the cybersecurity program's discipline

University	Princess Sumaya University for Technology	University of Bahrain	Plymouth University	Unversity of central Missouri	Cosmats University	Edith Cowan University	21 UMAS
			6.3. Knowledge and understanding of information security issues in relation to the design, development and use of information systems **6.4.** Knowledge and understanding of scientific and engineering principles **6.5.** Knowledge and understanding of mathematical principles **6.6.** Knowledge and understanding of computational modelling **6.7.** Use appropriate theoretical and practical processes to specify, deploy, verify and maintain computer-based systems **6.8.** Define problems, manage design process and evaluate outcomes				to accomplish a common goal. **D2.** Commit to professional ethics, responsibilities, and norms of professional computing practices. **D3.** Communicate effectively in writing and verbally computing and cybersecurity concepts and implications to wide range of audiences. **D4.** Engage in continuing professional development and lifelong learning as a computing professional.

University	Princess Sumaya University for Technology	University of Bahrain	Plymouth University	Unversity of central Missouri	Cosmats University	Edith Cowan University	21 UMAS
			6.9. Apply principles of appropriate supporting engineering and scientific disciplines				

2- Mapping of Program Mission with the University, Faculty and Department Missions:

University Mission	Faculty of Medical Technology Mission	Department of CyberSecurity Mission	Cyber security and digital forensics Program Mission
Leadership of transformation in managing and providing the health care with all partners via having the distinction standard in education and applied and medical researches that meet the needs of Yemeni people and regional influence.	Participation in leading the medical technological transformation to provide technically and informatically integrated health care, through the provision of scientific educational programs with solid and contemporary academic dimensions, and research services of a creative nature that meet the needs of the Yemeni health sector, its specificity and regional needs.	To lead in cybersecurity and digital forensics by providing cutting-edge education, fostering research, and offering innovative solutions that meet the evolving needs of the Yemeni digital sector and the region.	To equip students with the knowledge and skills necessary to drive digital security advancements, supporting digital transformation through applied education and research that aligns with the technological needs of Yemen and the region.

3- Mapping of Program Objectives with the University, Faculty and Department Objectives:

University Objectives	Faculty of Medical Technology Objectives	Department of CyberSecurity Objectives	Cyber security and digital forensics Program Objectives
1- Ensuring the application of quality standards and having the distinction standards in medical and applied sciences, scientific research and community service. 2- Adopting student-centered learning, the partnership with them for life, consolidating the principles of national responsibility and faith identity, looking after them and developing their capabilities after graduation and during work. 3- Attracting and Eemploying scientists, cadres and talents to gain minds and put an end for the "brain drain" in a way that promotes and ensures the availability of thinkers, businessmen and good citizens. 4- Developing the distinguished academic infrastructure continuously and establishing modern research and service centers with high efficiency that can give a real effect locally and regionally. 5- Enhancing the university status as a preferred partner for local, regional and international partnership through implementing creative styles of education, exchanging researches and knowledge, and	1- Applying Total Quality Standards, and setting an academic excellence in medical technology sciences, scientific research and community service. 2- Centrality of students in the educational process, their participation, as well as, looking after them, establishing originality values and developing their potential after graduation and during work. 3- Attracting highly scholars cadres, and highly specialized talents in medical technology thus enhances and ensures that there are thinkers, businessmen, and good citizens. 4- Harnessing all available capabilities of infrastructure, academic, training centers, as well as, modern researches and service centers and available educational laboratories to achieve the desired goals of the college of medical technology in order to meet the needs of the labor market. **5-** Enhance the university and college position as an ideal partner for the academic and health sectors at the local,	1- Implementing quality standards in cybersecurity and digital forensics education, research, and community service. 2- Adopting student-centered learning, nurturing national responsibility, and enhancing students' skills post-graduation. 3- Attracting skilled professionals to reduce brain drain, fostering innovation and national development in the cybersecurity sector. 4- Continuously developing state-of-the-art academic and research infrastructure, ensuring real-world impact locally and regionally. **5-** Strengthening the department's role as a key partner in local, regional, and international collaborations, offering cutting-edge cybersecurity and digital forensics education and research to meet market needs.	1- Achieving academic excellence in cybersecurity and digital forensics through quality standards, research, and service. 2- Engaging students in the learning process, fostering national responsibility, and supporting their professional growth. 3- Attracting highly qualified faculty and experts in cybersecurity to enhance the program and meet national and regional needs. 4- Leveraging modern infrastructure, research centers, and training facilities to provide practical and relevant cybersecurity education. 5- Strengthening the program's role in advancing professional

University Objectives	Faculty of Medical Technology Objectives	Department of CyberSecurity Objectives	Cyber security and digital forensics Program Objectives
providing real and effective outcomes for developing professional practices to benefit from them locally and regionally.	regional and international levels by providing educational programs for developing professional practices and useful health-care services.		practices and offering impactful solutions to the cybersecurity challenges faced locally and regionally.

18.4. Annex- 6, Alignment of Program Intended Learning Outcomes (PILOs) to the Faculty Objective

Program PILOs	Faculty Objectives				
	FObj1	FObj2	FObj3	FObj4	FObj5
A1	√				
A2		√	√		
A3	√		√		
A4	√				
B1					√
B2		√			
B3	√			√	
B4		√	√		
C1		√			
C2		√			
C3			√		
C4				√	
D1	√	√			√
D2		√			√
D3		√			√
D4			√	√	√

Annex- 7, Alignment of Program Intended Learning Outcomes (PILOs) to the Department Objective

Program PILOs	Department Objectives				
	DObj1	DObj2	DObj3	DObj4	DObj5
A1	√				
A2	√				
A3	√	√			
A4	√		√		√
B1	√	√			
B2			√		
B3		√			√
B4		√			√
C1	√		√		
C2		√	√		
C3	√	√	√		
C4			√		
D1				√	
D2					
D3				√	
D4	√				√

Annex- 8, Alignment of Program Intended Learning Outcomes (PILOS) to Program Objectives (POs)

Program PILOs	Program Objectives				
	POBj1	POBj2	POBj3	POBj4	POBj5
A1	√	√	√		
A2		√	√	√	
A3	√	√	√	√	
A4		√	√		
B1			√	√	√
B2			√	√	√
B3			√		√
B4	√		√		
C1		√	√	√	√
C2	√	√	√	√	√
C3		√	√	√	√
C4		√		√	
D1				√	√
D2				√	√
D3		√			√
D4		√			√

Annex- 9, Mapping of Program Objectives to the Faculty Mission

Program Objectives	Faculty Mission			
	Highly Qualified Graduates	Professional Skills	Knowledge Contribution	Society Needs
PObj1	√	√	√	√
PObj2		√	√	
PObj3	√	√	√	
PObj4			√	
PObj5		√		√

Annex- 10, Mapping Program Objectives to the Department Mission

Program Objectives	Department Mission			
	Professional Education	Excellent Academic Programs	Competitive Graduates	Employment Needs
PObj1	√	√	√	√
PObj2		√	√	√
PObj3	√	√	√	
PObj4		√	√	
PObj5		√	√	√

Annex- 11, Mapping of Program Objectives (POs) to the Department Objectives

Program Objectives	Department Objectives				
	DObj1	DObj2	DObj3	DObj4	DObj5
PObj1	√	√	√	√	
PObj2	√		√	√	
PObj3	√				
PObj4	√	√	√		
PObj5	√	√		√	√

Annex- 12, Survey of PILOs for Similar Accredited Programs at National and International Universities

Program PILOs	Similar Accredited Programs					
	Princess Sumaya University for Technology	University of Bahrain	Plymouth University	Unversity of central Missouri	Cosmats University	Edith Cowan University
A1			1.1, 6.4, 6.5, 6.6			LO-4
A2			1.2, 6.4,		POE-3	LO-4
A3			1.3, 5.3, 5.7			
A4			1.1, 6.3			
B1	SLO-1	SLO-1	3.1	SLO-1	POE-3	LO-3
B2			2.2, 6.7		POE-5	
B3	SLO-6		6.7			
B4		SLO-2		SLO-2	POE-4	
C1	SLO-6		5.1, 6.9		POE-2, POE-4	LO-1, LO-3
C2	SLO-2	SLO-2	5.7	SLO-2		
C3			2.4, 5.2		POE-5	
C4	SLO-6, SLO-7	SLO-6	5.7, 6.9	SLO-6		LO-2
D1	SLO-5	SLO-5	3.4, 3.6, 4.2	SLO-5	POE-6	LO-7
D2	SLO-4	SLO-4	4.1	SLO-4	POE-9	LO-6
D3	SLO-3	SLO-3	3.1, 4.3, 5.4, 5.5	SLO-3	POE-7	LO-5
D4			3.5, 4.5		POE-1, POE-10	LO-8

اسم هيئة الاعتماد: مجلس الاعتماد الأكاديمي وضمان جودة التعليم العالي، اصدار المعايير: مايو 2018م إن وجد

Annex- 13, Alignment of Program PILOs with Council of Accreditation and Standards

Program PILOs	ABET Student Outcomes Criterion
A1	
A2	
A3	
A4	
B1	1
B2	
B3	6
B4	
C1	6
C2	2
C3	
C4	6
D1	5
D2	4
D3	3
D4	

1. Proposed Program Criteria for Associate Cybersecurity and Similarly Named Programs

These program criteria apply to computing programs using cybersecurity, cyber operations, computer security, information assurance, information security, computer forensics, or similar terms in their titles.

Note. Criterion 3 and 5 listed below replace, not extend, Criterion 3 and 5 stated in the CAC General Criteria.

1- Criterion 3. Student Outcomes

The program must have documented and publicly stated student outcomes that include (1) through (6) below and any outcomes required by applicable Program Criteria. The program may define additional outcomes.

Graduates of the program will have an ability to:

1. Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
2. Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
3. Communicate effectively in a variety of professional contexts.
4. Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.
5. Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.
6. Apply security principles and practices to maintain operations in the presence of risks and threats.

2- Criterion 5. Curriculum

The curriculum requirements are in addition to the General Criteria curriculum requirements and specify topics, but do not prescribe specific courses. These requirements are:

The curriculum requirements specify topics, but do not prescribe specific courses.

These requirements are:

A. At least 45 semester credit hours (or equivalent) of computing and cybersecurity course work. The course work must include:

1 Application of techniques, skills, and tools necessary for cybersecurity practice.

2 Application of the crosscutting concepts of confidentiality, integrity, availability, risk, adversarial thinking, and systems thinking.

3 Fundamental topics from each of the following:

- **a.** Data Security: protection of data at rest, during processing, and in transit.
- **b.** Software Security: development and use of software that reliably preserves the security properties of the protected information and systems.

c. Component Security: the security aspects of the design, procurement, testing, analysis, and maintenance of components integrated into larger systems.

d. Connection Security: security of the connections between components, both physical and logical.

e. System Security: security aspects of systems that use software and are composed of components and connections.

f. Human Security: the study of human behavior in the context of data protection, privacy, and threat mitigation.

g. Organizational Security: protecting organizations from cybersecurity threats and managing risk to support successful accomplishment of the organizations' missions.

h. Societal Security: aspects of cybersecurity that broadly impact society asa whole.

4 Advanced cybersecurity topics that build on crosscutting concepts and fundamental topics to provide depth.

B. At least 6 semester credit hours (or equivalent) of mathematics that must include discrete mathematics and statistics.

The program must ensure its students have the mathematical skills and an understanding of the scripting and programming concepts required for cybersecurity practice to meet its student outcomes and program educational objectives.

Annex- 14, Survey of Credit Hours of Similar Programs

Benchmarking		Princess Sumaya University of Technology	Bahrain University	Plymouth University	University of Central Missouri	Comsats Uniersity	Edith Cowan University	Average Cr. Hrs.
University Requirements	Credit Hours	15	11		9	21	-	00%
	Percentage	11%	8%		7.5%	16%	-	00%
University Electives	Credit Hours	30	9		30	12	-	00%
	Percentage	23%	7%		25%	9%	-	00%
Faculty Requirements	Credit Hours	15	21		-	59	-	00%
	Percentage	11%	16%		-	45%	-	00%
Department Requirements	Credit Hours	-	-		42	-	-	00%
	Percentage	-	-		35%	-	-	00%
Department Electives	Credit Hours	-	-		12	-	-	00%
	Percentage	-	-		10%	-	-	00%
Major Requirements	Credit Hours	50	75	360 points	15	19	300 points	00%
	Percentage	38%	57%	**100%**	12.5%	14%	83%	00%
Major Electives	Credit Hours	18	12		12	15	30 points	00%
	Percentage	14%	9%		10%	11%	8.5%	00%
Practical Courses	Credit Hours	-	-		-	-	60 points	00%
	Percentage	-	-		-	-	17%	00%
Training Courses	Credit Hours	3	1		-	-	-	00%
	Percentage	2%	0.75%		-	-	-	00%
Project Courses	Credit Hours	2	3		-	6	30 points	00%
	Percentage	1%	2%		-	5%	8.5%	00%
Total Credit Hours	Credit Hours	133	132	360 points	120	132	360 points	

Annex- 15, Survey of Number of Courses and Credit Hours of Similar Programs

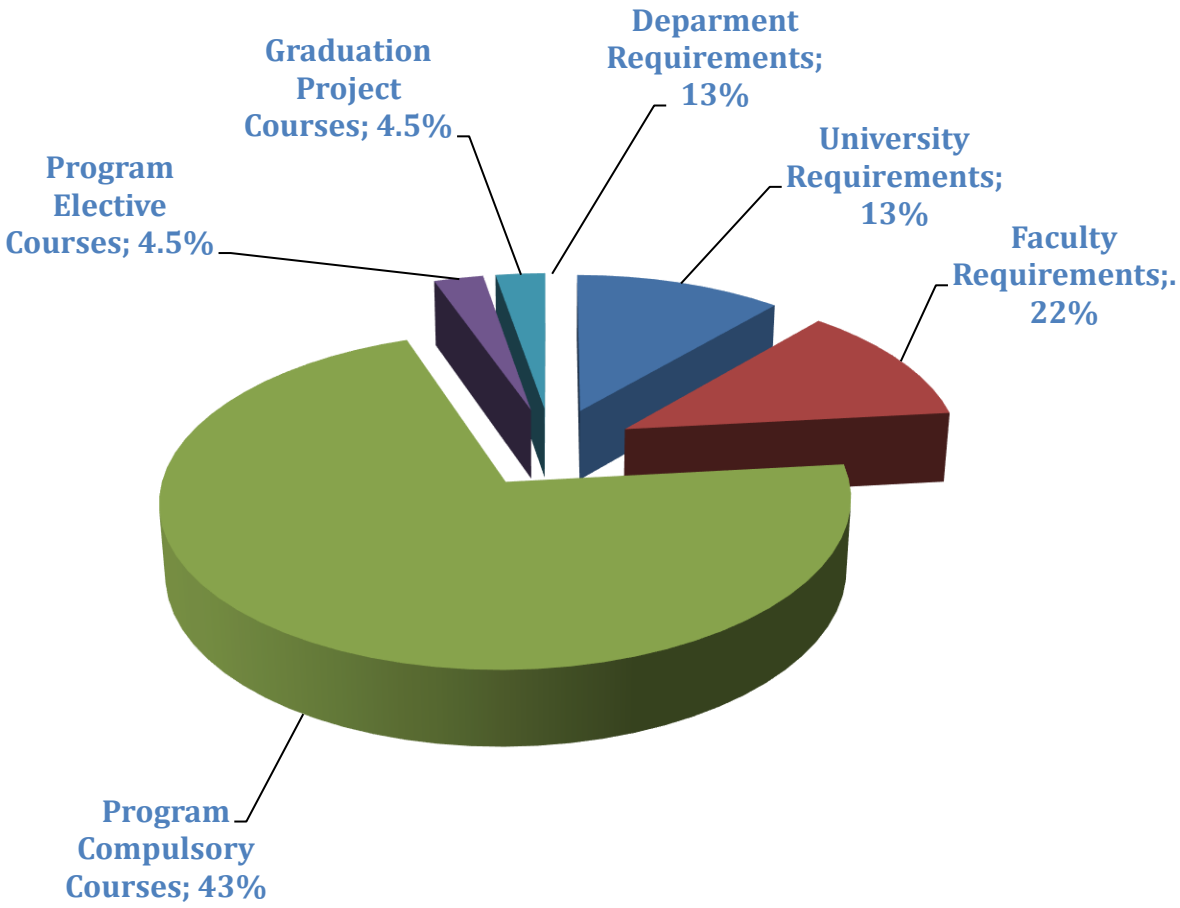
University		Princess Sumaya University of Technology		Bahrain University		Plymouth University		University of Central Missouri		Comsats Uniersity		Edith Cowan University	
Total Courses and Cr. Hrs.		Cr. Hrs.	Courses	Cr. Hrs.	Courses	Cr. Hrs.	Courses	Cr. Hrs.	Courses	Cr. Hrs.	Courses	Cr. Hrs.	Courses
University Requirements	Compulsory	15	5	11	4	-	-	9	3	21	7	-	-
	Electives	30	10	9	3	-	-	30	10	12	4	-	-
Faculty Requirements	Compulsory	15	5	21	7	-	-	-	-	59	18	-	-
	Electives	-	-	-	-	-	-	-	-	-	-	-	-
Department Requirements	Compulsory	-	-	-	-	-	-	42	14	-	-	-	-
	Electives	-	-	-	-	-	-	12	4	-	-	-	-
Major Requirements	Compulsory	50	15	75	25	360 points	15	15	5	19	6	300 points	20
	Electives	18	6	12	4	0 points	2	12	4	15	5	30 points	2
	Graduation Project	2	2	3	1	-	-	-	-	6	2	30 points	1
	Summer Training	3	1	1	1	-	-	-	-	-	-	-	-
	Field Training	-	-	-	-	-	-	-	-	-	-	60 points	1
	Practical Skills	-	-	-	-	-	-	-	-	-	-	-	-
Other Courses													
Total		Cr. Hrs.	Courses	Cr. Hrs.	Courses	Cr. Hrs.	Courses	Cr. Hrs.	Courses	Cr. Hrs.	Courses	Cr. Hrs.	Courses
		133	44	132	45	360 p	17	120	40	132	42	360 p	21-23

Annex- 16, Themes of Courses of Study and their Weightage

#	Themes	No. of Courses	Credit Hours	Percentage of Cr. Hrs.
0	University Requirements	7	14	10%
1	Faculty Requirements	20	57	41%
2	Department Courses	0	0	0%
3	General Courses (Program Courses)	19	57	41%
4	Elective Courses (Program Courses)	2	6	4%
5	Graduation Project Courses*	2	6	4%
6	Field Training	1	0	0
Program Total		51	140	100%

* The Project Courses Credit Hours are already added to the total credit hours with the faculty requirements.

Themes of Courses of Study and their Weightage



Annex- 17, Coding System

Program	Level	Semester	Theme Code	No. of the course in the list
CCY	1	1	0	1

Themes	Theme Code	No.	Course Title	Course Code	Credit Hours				Prerequisites/ Co-requisites	Level/Term
					Cr. Hrs.	L	T	P		
University Requirements	0	**1.**	English 101	06.11.701	2	2	0	0		1/1
		2.	Arabic Israeli Conflict	06.11.702	2	2	0	0		1/1
		3.	English 102	06.11.703	2	2	0	0		1/2
		4.	Islamic Culture	06.11.704	2	2	0	0		1/2
		5.	National Culture	06.11.705	2	2	0	0		1/2
		6.	Arabic 1	06.11.706	2	2	0	0		1/1
		7.	Arabic 2	06.11.707	2	2	0	0		1/2
Total					14	14	0	0		

Themes	Theme Code	No.	Course Title	Course Code	Credit Hours				Prerequisites/ Co-requisites	Level/Term
					Cr. Hrs.	L	T	P		
Faculty Requirements	1	**1.**	Fundamentals of Computer	07.01.701	3	2	-	2		1/1
		2.	Physices	07.02.703	3	2	-	2		1/1
		3.	Mathematics 1	07.02.701	3	2	2	-		1/1
		4.	Programming 1	07.11.702	3	2	-	2		2/1
		5.	Mathematics 2	07.12.704	3	2	2	-		2/1
		6.	Communication Skills and Presentation	05.01.715	2	2	-	-		2/1
		7.	Programming 2	07.11.703	3	2	-	2		1/2

		8.	Linear Algebra	07.13.702	3	2	2	-		1/2
		9.	Computer network	07.11. 704	3	2	-	2		1/2
		10.	Database Systems	07.11. 705	3	2	-	2		1/2
		11.	Computer System Architecture	07.11. 707	3	2	-	2		1/2
		12.	Probability and Statistics	05.11.709	3	2	2	-		1/2
		13.	Object-Oriented Programming	07.11. 708	3	2	-	2		2/2
		14.	Operating System	07.11. 709`	3	2	-	2		2/2
		15.	System Analysis and Design	07.11. 710	3	2	-	2		2/2
		16.	Data Structure and Algorithms	07.11. 712	3	2	-	2		2/2
		17.	Web design and development	07.11. 715	3	2	-	2		1/3
		18.	Research Methodology	05.02.720	2	2	-	-		2/3
		19.	Mobile Application Development	07.11. 724	3	2	-	2		1/4
		20.	Entrepreneurship	07.11. 730	2	2	-	-		2/4
Total					**63**	**46**	**8**	**26**		

Themes	**Theme Code**	**No.**	**Course Title**	**Course Code**	**Credit Hours**				**Prerequisites/ Co-requisites**	**Level/Term**
					Cr. Hrs.	L	T	P		
Department Courses	2	**1.**	-	-	-	-	-	-	-	-
		2.	-	-	-	-	-	-	-	-
		3.	-	-	-	-	-	-	-	-
		4.	-	-	-	-	-	-	-	-
		5.	-	-	-	-	-	-	-	-
		6.	-	-	-	-	-	-	-	-
Total					**18**	**16**	**2**	**2**		

Themes	**Theme Code**	**No.**	**Course Title**	**Course Code**	**Credit Hours**				**Prerequisites/ Co-requisites**	**Level/Term**
					Cr. Hrs.	L	T	P		
General Courses (Program Courses)	3	**1.**	Introduction to Cybersecurity	07.14. 701	3	3	-	-		2/1
		2.	Cryptography Principles	07.14. 702	3	2	-	2		1/2
		3.	Information Security	07.14. 703	3	2	-	2		2/2

		4.	Risk Management	07.14. 702	3	3	-	-		2/2
		5.	Network Security	07.14. 702	3	3	-	-		2/2
		6.	Threats Analysis and Modeling	07.14. 704	3	2	-	2		1/3
		7.	Software Security Development	07.14. 705	3	2	-	2		1/3
		8.	Access Control and Identity Management	07.14. 706	3	2	-	2		1/3
		9.	Introduction to Digital Forensics	07.14. 707	3	2	-	2		1/3
		10.	Security Strategy and Planning	07.14. 708	3	3	-	-		1/3
		11.	Information System Security Management	07.14. 709	3	3	-	-		2/3
		12.	Ethical Hacking	07.14. 710	3	2	-	2		2/3
		13.	Artificial Intelligence for Cybersecurity	07.14. 711	3	2	-	2		2/3
		14.	Personal Privacy and Social Engineering	07.14. 712	3	3	-	-		2/3
		15.	Digital forensics laws and professional ethics	07.14. 713	3	3	-	-		2/3
		16.	Network Forensics	07.14. 714	3	2	-	2		1/4
		17.	Cybersecurity Operations	07.14. 715	3	3	-	-		1/4
		18.	Mobile Forensics	07.14. 717	3	2	-	2		2/4
		19.	System Components Security and Testing	07.14. 719	3	3	-	-		2/4
				Total	**57**	**47**	**0**	**20**		

Themes	**Theme Code**	**No.**	**Course Title**	**Course Code**	**Credit Hours**				**Prerequisites/ Co-requisites**	**Level/Term**
					Cr. Hrs.	L	T	P		
Graduation Project Courses	5	**1.**	Final Project 1	07.11. 727	3	3	-	-		4/1
		2.	Final Project 2	07.11. 728	3	3	-	-		4/2

Total		6	6	0	0		

Themes	Theme Code	No.	Course Title	Course Code	Credit Hours				Prerequisites/ Co-requisites	Level/Term
					Cr. Hrs.	L	T	P		
Field Training	6		Field Training	**sum**	Pass	-	-	-	After completed 90 Credit Hours	
Total										

Annex- 18, Survey of Course Names per Academic Semesters of Similar Programs

University		21 UMAS	Princess Sumaya University for Technology	Bahrain University	Plymouth University	University of Central Missouri	Comsats Uniersity	Edith Cowan University
No of Courses			**44**	**45**	**16**	**33**	**42**	**21-23**
Total Cr. Hrs.			**132**	**132**	**360 points**	**120**	**132**	**360 points**
Total Years			**4**	**4**	**3**	**4**	**4**	**3**
		Level 1						
Semester	**No**	**Course Name**	**Course Name**	**Course Name**	**Course Name**	**Course Name**	**Course Name**	**Course Name**
1	1	Arabic 101	Discrete Mathematics	Calculus (1)	Software Engineering 1	General Education Requirements	Calculus and Analytic Geometry	Mathematics for Computing
	2	English 101	Computer skills for scientific facilities	Computer Programming I	Computer Systems	Introduction to Compuer Programming GE	Programming Fundamentals	Programming Principles
	3	Islamic Culture	Introduction to Computer Science	Fundamentals of Information Systems	Computing Practice	Introduction to Cybersecurity	Software Engineering Concepts	Professional Science Essentials
	4	National Culture	Calculus (1)	Arabaic Language Skills	Computing Placement Preparation	Composition	Introduction to Cyber Security	Systems Analysis
	5	Fundamentals of Computer	Uni Requirement	Language Develooment		Professional speaking and presentation Or Public Speaking Or Communicaton in Practice	Introduction to ICT	
	6	Physices				Orientation in Cybersecurity	Principles of Microeconomics	
	7	Mathematics 1						
	8							
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University		21 UMAS	Princess Sumaya University for Technology	Bahrain University	Plymouth University	University of Central Missouri	Comsats Uniersity	Edith Cowan University
2	1	Arabic 102	Data Structures and Algorithms for Cybersecurity	Introduction to Computer & Network Technology	Cyber Security & Networks	Basics Statistics	Professional Practices for Cyber Security	Computer Security
	2	English 102	Website Design And Web Graphics	Computer Programming II	Algorithms & Data Structures	Command line environment	Data Structures and Algorithms	Computer Fundamentals
	3	Arabic Israeli Conflict	Cybersecurity Fundamentals	Language Development II	Computing Practice	General education elective	Digital Logic Design	Applied Communications
	4	Programming 1	Uni Requirement	Business Elective I		Technical Writing or Composition 2	English Comprehension and Composition	Systems and Database Design
	5	Mathematics 2		Modern History of Bahrain and Citizenship			Pakistan Studies	
	6	Communication Skills and Presentation					Financial Accounting	
	7	Introduction to Cybersecurity						
	8							
	9							
--		--	4	--	--	--	--	
Level 2								
Semester	No	Course Name	Course Name	Course Name	Course Name	Course Name	Course Name	Course Name
1	1	Programming 2	Linear Algebra	Fundamentals of Cybersecurity	Software Engineering 2	Discrete structure	Discrete Structures	Cryptographic Concepts
	2	Linear Algebra	Calculus 2	Database Management Systems	Information Management &	Computer system administration	Database Systems	IoT and OT Security

University		21 UMAS	Princess Sumaya University for Technology	Bahrain University	Plymouth University	University of Central Missouri	Comsats Uniersity	Edith Cowan University
					Retrieval			
	3	Computer network	Programming for Security Professionals & lab	Data Structures	Computing Group Project	Usable privacy and security	Design and Analysis of Algorithms	Scripting Languages
	4	Database Systems	Information systems risk management	Computer Networks I	Computing Placement Preparation	General education / elective	Data Communications and Computer Networks	IT Security Management
	5	Computer System Architecture	Uni requirement	Technical Report Writing		Computer Programming	Linear Algebra	
	6	Cryptography Principles		Human Rights			New Product Development	
	7	Probability and Statistics						
--		--	--	--	--	--	--	
2	1	Object-Oriented Programming	Database Systems & lab	Cloud Computing I	Artificial Intelligence	Secure Programming	Artificial Intelligence	Network Security Fundamentals
	2	Information Security	Statistical Methods	IT Project Management I	Security Architectures and Cryptography	Computer Programming 2	Operating Systems	Project Methods and Professionalism
	3	Operating System	Secure Assembly Coding	Discrete Structures I	Computing Group Project	General education / free elective	Vulnerability Assessment & Reverse Engineering	Software Reverse Engineering
	4	System Analysis and Design	Cryptography Principles and Practice	Network Operating Systems			Report Writing Skills	Computer Forensics
	5	Risk Management	Uni requirement	Computer Networks II			Differential Equations	
	6	Network Security	Uni requirement	Business Elective II			Computer Architecture	
	7	Data Structure and Algorithms						
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University		21 UMAS	Princess Sumaya University for Technology	Bahrain University	Plymouth University	University of Central Missouri	Comsats Uniersity	Edith Cowan University
		Level 3						
Semester	No	Course Name	Course Name	Course Name	Course Name	Course Name	Course Name	Course Name
1	1	Threats Analysis and Modeling	Special Topics in Cybersecurity	Network Security I	Information Security Management and Governance	Introduction to cryptography	Parallel and Distributed Computing	Ethical Hacking and Defence
	2	Web design and development	Computer Networks Architecture and Virtualization	Network Programming	Security Operations and Incident Management	System Security	Information Security	Data Analysis and Visualisation
	3	Software Security Development	Network and Cloud Monitoring & Documenting	Internet Software Development	Computing Individual Project	General education/free elective	Communication Skills	Enterprise Security and Governance
	4	Access Control and Identity Management	Uni requirement	Design of Algorithms		Data Structures	Statistics and Probability Theory	Cyber Security Incident Detection and Response
	5	Introduction to Digital Forensics	Uni requirement	Probability and Statistics			Fundamentals of Marketing	
	6	Security Strategy and Planning						
	7			Humanities and Social Sciences Elective				
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2	1	Information System Security Management	Hacking Techniques and Intrusion Detection	Cryptography	Ethical Hacking	Introduction to Cyber-Physical Systems Security	Digital Forensics	
	2	Ethical Hacking	Network Security and Protocols & lab	Secure Software Engineering	Digital Forensics and Malware Analysis	Introduction to Information Assurance	Information Assurance	
	3	Research Methodology	Advanced Applied Cryptography	Governance and Management of	Computing Individual Project	Software Engineering	Network Security	

University		21 UMAS	Princess Sumaya University for Technology	Bahrain University	Plymouth University	University of Central Missouri	Comsats Uniersity	Edith Cowan University
				Enterprise IT				
	4	Artificial Intelligence for Cybersecurity	Special Topic Cybersecurity (2)	Entrepreneurship and Digital Innovation		general Education/Free Elective	Islamic Studies	
	5	Personal Privacy and Social Engineering	Uni requirement	Islamic Culture			Malware Analysis	
	6	Digital forensics laws and professional ethics		Internship in Cybersecurity			New Product Development	
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Level 4								
Semester	No	Course Name	Course Name	Course Name	Course Name	Course Name	Course Name	Course Name
1	1	Mobile Application Development	System Auditing and Security Polices	Information Security		Computer Networking	Microprocessor and Assembly Language	
	2	Network Forensics	Security and Privacy of Big data	IT Auditing and Business Continuity		Ethical Hacking	Secure Software Design and Development	
	3	Cybersecurity Operations	Operating system & lab	Cyber ethics		Secure software engineering	Project Planning and Monitoring	
	4	Elective 1	Graduation Project1	ITCY Elective 1		Cybersecurity Major Electives	Cyber Threat Intelligence	
	5	Final Project 1	Intelligent Threat Detection	ITCY Elective 2			Final Year Project – I*	
	6		Practical Training					
	7		University requirement	Senior Project				
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University		21 UMAS	Princess Sumaya University for Technology	Bahrain University	Plymouth University	University of Central Missouri	Comsats Uniersity	Edith Cowan University
2	1	Final Project 2	Secure Systems Development and Design	Digital Forensics		Computer and Network Forensics	Wireless and Mobile Security	
	2	Mobile Forensics	Digital Forensics and Incident Response & lab	Security Risk Assessment and Countermeasures		Free Electives	Penetrating Testing	
	3	Elective 2	Graduation Project 2	Ethical Hacking		Cybersecurity Major Elective	Final Year Project – II	
	4	System Components Security and Testing	Uni requirement	ITCY Elective 3				
	5	Entrepreneurship		ITCY Elective 4				
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Annex- 19, Comparison of Program Courses and Similar Programs Courses

#	21 UMAS					Bahrain University					Plymouth University					University of Central Missouri					Cosmats University					Edith Cowan University					Princess Sumaya				
	Course	Course Hours				Course	Course Hours				Course	Course Hours				Course	Course Hours				Course	Course Hours				Course	Course Hours				Course	Course Hours			
		CH	L	T	P		CH	L	T	P		CH	L	T	P		CH	L	T	P		CH	L	T	P		CH	L	T	P		CH	L	T	P
	Level 1																																		
1	Arabic 101	2	2	-	-	Fundamentals of Information Systems	3	3		2	Software Engineering 1	20				General Education Requirements	3				Introduction to ICT	3	2		1	Professional Science Essentials	15				Discrete Mathematics	3			
2	English 101	2	2	-	-	Computer Programming I	3	3		2	Computer System	20				Introduction to Cybersecurity	3				Programming Fundamentals	4	3		1	Programming Principles	15				Computer Skills for Scientific Facilities	3			
3	Islamic Culture	2	2	-	-	Calcuus 1	3	3		0	Computing Practice	40				Introduction to Compuer Programming GE	3				Software Engineering Concepts	3	3		0	Mathematics for Computing	15				Introduction to Computer Science	3			
4	National Culture	2	2	-	-	Arabaic Language Skills	3	3		0	Computing Placement Preparation.	0				Composition	3				Introduction to Cyber Security	4	3		1	Systems Analysis	15				Calculus (1)	3			
5	Fundamentals of Computer	3	2	-	2	Language Develooment 1	3	3		0						Professional speaking and presentation	3				Calculus and Analytic Geometry	3	3		0	Applied Communications	15				University Requirement	3			
6	Physices	3	2	-	2											Public Speaking	3				Principles of Microeconomics	3	3		0	Computer Security	15								

#	21 UMAS					Bahrain University					Plymouth University					University of Central Missouri					Cosmats University					Edith Cowan University					Princess Sumaya				
	Course	Course Hours				Course	Course Hours				Course	Course Hours				Course	Course Hours				Course	Course Hours				Course	Course Hours				Course	Course Hours			
		CH	L	T	P		CH	L	T	P		CH	L	T	P		CH	L	T	P		CH	L	T	P		CH	L	T	P		CH	L	T	P
7	Mathematics 1	3	2	2	-											Communicaton in Practice	3									Computer Fundamentals	15								
8																Orientation in Cybersecurity	1									Systems and Database Design	15								
9																																			
1	Arabic 102	2	2	-	-	Computer Programming II	3	3		2	Cyber Security & Networks	20				Basics Statistics	3				Digital Logic Design	4	3		1						Data Structures and Algorithms for Cybersecurity	3			
2	English 102	2	2	-	-	Introduction to Computer & Network Technology	3	3		2	Algorithms & Data Structures	20				Command line environment	3				Data Structures and Algorithms	4	3		1						Website Design And Web Graphics	3			
3	Arabic Israeli Conflict	2	2	-	-	Language Development II	3	3		0	Computing Practice	40				General education elective	6				Professional Practices for Cyber Security	3	3		0						Cybersecurity Fundamentals	3			
4	Programming 1	3	2	-	2	Business Elective I	3	3		0						Technical Writing or Compositiion 2	3				English Comprehension and Composition	3	3		0						Uni Requirement	3			
5	Mathematics 2	3	2	2	-	Modern History of Bahrain and Citizenship	3	3		0											Pakistan Studies	3	3		0										

#	21 UMAS					Bahrain University					Plymouth University					University of Central Missouri					Cosmats University					Edith Cowan University					Princess Sumaya				
	Course	Course Hours				Course	Course Hours				Course	Course Hours				Course	Course Hours				Course	Course Hours				Course	Course Hours				Course	Course Hours			
		CH	L	T	P		CH	L	T	P		CH	L	T	P		CH	L	T	P		CH	L	T	P		CH	L	T	P		CH	L	T	P
6	Communication Skills and Presentation	2	2	-	-																Financial Accounting	3	3		0									
7	Introduction to Cybersecurity	3	3	-	-																													
8																																		
9																																		
	Level 2																																	
1	Programming 2	3	2	-	2	Fundamentals of Cybersecurity	3	3		2	Software Engineering 2	20				Discrete structure	3				Discrete Structures	3	3		0	Cryptographic Concepts	15				Algebra	3			
2	Linear Algebra	3	2	2	-	Database Management Systems	3	3		2	Information Management & Retrieval	20				Computer system administration	3				Database Systems	4	3		1	IoT and OT Security	15				Calculus 2	3			
3	Computer network	3	2	-	2	Data Structures	3	3		2	Computing Group Project	40				Usable privacy and security	3				Design and Analysis of Algorithms	3	3		0	Scripting Languages	15				Programming for Security Professionals & lab	4	3		1
4	Database Systems	3	2	-	2	Computer Networks I	3	3		2	Computing Placement Preparation.	0				General education / elective	3				Data Communications and Computer Networks	3	2		1	IT Security Management	15				Information systems risk management	3			
5	Computer System Architecture	3	2	-	2	Technical Report Writing	3	3		0						Computer Programming	3				Linear Algebra	3	3		0	Network Security Fundamentals	15				Uni requirement	3			
	Cryptography Principles	3	2	-	2	Human Rights	2	2		0											New Product Development	3	3		0	Project Methods and Professionalism	15				Database Systems & lab	4	3		1

#	21 UMAS					Bahrain University					Plymouth University					University of Central Missouri					Cosmats University					Edith Cowan University					Princess Sumaya				
	Course	Course Hours				Course	Course Hours				Course	Course Hours				Course	Course Hours				Course	Course Hours				Course	Course Hours				Course	Course Hours			
		CH	L	T	P		CH	L	T	P		CH	L	T	P		CH	L	T	P		CH	L	T	P		CH	L	T	P		CH	L	T	P
6	Probability and Statistics	3	2	2	-																													
7	Programming 2	3	2	-	2																													
1	Object-Oriented Programming	3	2	-	2	Cloud Computing I	3	3		2	Artificial Intelligence	20				Secure programming	3				Artificial Intelligence	3	2		1	Software Reverse Engineering	15				Statistical Methods	3			
2	Information Security	3	2	-	2	IT Project Management I	3	3		2	Security Architectures and Cryptography	20				Computer programming 2	3				Operating Systems	3	2		1	Computer Forensics	15				Secure Assembly Coding	2			
3	Operating System	3	2	-	2	Discrete Structures I	3	3		2	Computing Group Project	40				General education / free elective	9				Vulnerability Assessment & Reverse Engineering	3	2		1						Cryptography Principles and Practice	3			
4	System Analysis and Design	3	2	-	2	Network Operating Systems	3	3		2											Report Writing Skills	3	3		0						Uni requirement	3			
5	Risk Management	3	3	-	-	Computer Networks II	3	3		2											Differential Equations	3	3		0						Uni requirement	3			
6	Network Security	3	3	-	-	Business Elective II	3	3		0											Computer Architecture	3	3		0										
7	Data Structure and Algorithms	3	2	-	2																													
	Level 3																																	
1	Threats Analysis and Modeling	3	2	-	2	Network Security I	3	3		2	Information Security Management and Governance	20				Introduction to cryptography	3				Parallel and Distributed Computing	3	2		1	Ethical Hacking and Defence	15				Special Topics in Cybersecurity	3			

#	21 UMAS					Bahrain University					Plymouth University					University of Central Missouri					Cosmats University					Edith Cowan University					Princess Sumaya				
	Course	Course Hours				Course	Course Hours				Course	Course Hours				Course	Course Hours				Course	Course Hours				Course	Course Hours				Course	Course Hours			
		CH	L	T	P		CH	L	T	P		CH	L	T	P		CH	L	T	P		CH	L	T	P		CH	L	T	P		CH	L	T	P
2	Web design and development	**3**	**2**	**-**	**2**	Network Programming	3	3		2	Security Operations and Incident Management	20				System security	3				Information Security	3	3		0	Data Analysis and Visualisation	15				Computer Networks Architecture and Virtualizatio n	3			
3	Software Security Development	**3**	**2**	**-**	**2**	Internet Software Development	3	3		2	Computing Individual Project	40				General education/free elective	6				Communicatio n Skills	3	3		0	Enterprise Security and Governance	15				Network and Cloud Monitoring & Documentin g	3			
4	Access Control and Identity Management	**3**	**2**	**-**	**2**	Design of Algorithms	3	3		2						Data structures	3				Statistics and Probability Theory	3	3		0	Cyber Security Incident Detection and Response	15				Uni requirement	3			
5	Introduction to Digital Forensics	**3**	**2**	**-**	**2**	Probability and Statistics	3	3		0											Fundamentals of Marketing	3	3		0	Applied Project	30				Uni requirement	3			
6	Security Strategy and Planning	**3**	**3**	**-**	**-**	Humanities and Social Sciences Elective	3	3		0																Elective	15				Hacking Techniques and Intrusion Detection	3			
1	Information System Security Management	**3**	**3**	**-**	**-**	Cryptography	3	3		2	Ethical Hacking	20				Introduction to Cyber-Physical Systems Security	3				Digital Forensics	3	2		1	Elective	15				Network Security and Protocols & lab	4	3		1
2	Ethical Hacking	**3**	**2**	**-**	**2**	Secure Software Engineering	3	3		2	Digital Forensics and Malware Analysis	20				Introduction to Information	3				Information Assurance	3	3		0	Work Experience Project	60				Advanced Applied Cryptograph	3			

#	21 UMAS					Bahrain University					Plymouth University					University of Central Missouri					Cosmats University					Edith Cowan University					Princess Sumaya				
	Course	Course Hours				Course	Course Hours				Course	Course Hours				Course	Course Hours				Course	Course Hours				Course	Course Hours				Course	Course Hours			
		CH	L	T	P		CH	L	T	P		CH	L	T	P		CH	L	T	P		CH	L	T	P		CH	L	T	P		CH	L	T	P
																Assurance															y				
3	Research Methodology	2	2	-	-	Governance and Management of Enterprise IT	3	3		2	Computing Individual Project	40				Software engineering	3				Network Security	3	2		1						Special Topic Cybersecurity (2)	3			
4	Artificial Intelligence for Cybersecurity	3	2	-	2	Entrepreneurship and Digital Innovation	3	3		2						general Education/Free Elective	6				Islamic Studies	3	3		0						Uni requirement	3			
5	Personal Privacy and Social Engineering	3	3	-	-	Islamic Culture	3	3		0											Malware Analysis	3	3		0										
6	Digital forensics laws and professional ethics	3	3	-	-	**Internship in Cybersecurity**	1	0		3											New Product Development	3	3		0						Research Methodology	3	2		2
	Level 4																																	
1	Mobile Application Development	3	2	-	2	Information Security	3	3		2						Computer Networking	3				Microprocessor and Assembly Language	3	2		1						System Auditing and Security Polices	3			
2	Network Forensics	3	2	-	2	IT Auditing and Business Continuity	3	3		2						Ethical Hacking	3				Secure Software Design and Development	3	2		1						Security and Privacy of Big data	3			
3	Cybersecurity Operations	3	3	-	-	Cyberethics	3	3		2						Secure software engineering	3				Project Planning and Monitoring	3	3		0						Operating system & lab	4	3		

#	21 UMAS					Bahrain University					Plymouth University					University of Central Missouri					Cosmats University					Edith Cowan University					Princess Sumaya				
	Course	Course Hours				Course	Course Hours				Course	Course Hours				Course	Course Hours				Course	Course Hours				Course	Course Hours				Course	Course Hours			
		CH	L	T	P		CH	L	T	P		CH	L	T	P		CH	L	T	P		CH	L	T	P		CH	L	T	P		CH	L	T	P
4	Elective 1	**3**	**3**	**-**	**-**	ITCY Elective 1	3	3		2						Cybersecurity Major Electives	6				Cyber Threat Intelligence	3	3		0						Graduation Project1	1			
5	Final Project 1	**3**	**3**	**-**	**-**	ITCY Elective 2	3	3		2											Final Year Project – I*	2	0		2						Intelligent Threat Detection	3			
6						Senior Project	3	0		6																						Practical Training	3			
1	Final Project 2	**3**	**3**	**-**	**-**	Digital forensics	3	3		2						Computer and network forensics	3				Wireless and mobile security	3	3		0						University requirement	3			
2	Mobile Forensics	**3**	**2**	**-**	**2**	Security Risk Assessment and Countermeasures	3	3		2						Free Elective	6				Penetrating Testing	3	2		1						Secure Systems Development and Design	3			
3	Elective 2	**3**	**3**	**-**	**-**	Ethical hacking	3	3		2						Cybersecurity major electives	6				Final year project – II	4	0		4						Digital Forensics and Incident Response & lab	4	3		1
4	System Components Security and Testing	**3**	**3**	**-**	**-**	ITCY Elective 3	3	3		2																						Graduation Project 2	1			
5	Entrepreneurship	**2**	**2**	**-**	**-**	ITCY Elective 4	3	3		2																						Uni requirement	3			

Annex- 20, Matrix of Mapping Program PILO's with Courses

I =Introduction; E=Extension; A=Application

#	Level/ Semester	Course Code	Course Title	Credit Hours	Theory Hours		Lab Hours	Program Intended Learning Outcomes (PILOs)															
								A. Knowledge & Understanding				B. Intellectual Skills				C. Practical Skills				D. Transferable Skills			
					Lecture	Exercise		A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4	D1	D2	D3	D4
1	1/1	06.11.702	Arabic 101	2	2	-	-																
2	1/1	06.11.701	English101	2	2	-	-																
3	1/1	06.11.703	Islamic Culture	2	2	-	-																
4	1/1	06.11.704	National Culture	2	2	-	-																
5	1/1	07.01.701	Fundamentals of Computer	3	2	-	2																
6	1/1	07.02.703	Physices	3	2	-	2																
7	1/1	07.02.701	Mathematics1	3	2	2	-																
8	2/1	06.11.706	Arabic 102	2	2	-	-																
9	2/1	06.11.705	English 102	2	2	-	-																
10	2/1	06.11.707	Arabic Israeli Conflict	2	2	-	-																
11	2/1	07.11.702	Programming 1	3	2	-	2																
12	2/1	07.12.704	Mathematics 2	3	2	2	-																

#	Level/ Semester	Course Code	Course Title	Credit Hours	Theory Hours		Lab Hours	Program Intended Learning Outcomes (PILOs)															
					Lecture	Exercise		A. Knowledge & Understanding				B. Intellectual Skills				C. Practical Skills				D. Transferable Skills			
								A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4	D1	D2	D3	D4
13	2/1	05.01.715	Communication Skills and Presentation	**2**	**2**	-	-																
14	2/1	07.14. 701	Introduction to Cybersecurity	**3**	**3**	-	-																
15	1/2	07.11.703	Programming 2	**3**	**2**	-	**2**																
16	1/2	07.13.702	Linear Algebra	**3**	**2**	**2**	-																
17	1/2	07.11. 704	Computer network	**3**	**2**	-	**2**																
18	1/2	07.11. 705	Database Systems	**3**	**2**	-	**2**																
19	1/2	07.11. 707	Computer System Architecture	**3**	**2**	-	**2**																
20	1/2	07.14. 702	Cryptography Principles	**3**	**2**	-	**2**																
21	1/2	05.11.709	Probability and Statistics	**3**	**2**	**2**	-																
22	2/2	07.11. 708	Object-Oriented Programming	**3**	**2**	-	**2**																
24	2/2	07.14. 703	Information Security	**3**	**2**	-	**2**																
25	2/2	07.11. 709`	Operating System	**3**	**2**	-	**2**																
26	2/2	07.11. 710	System Analysis and Design	**3**	**2**	-	**2**																
27	2/2	07.14. 702	Risk Management	**3**	**3**	-	-																
28	2/2	07.14. 702	Network Security	**3**	**3**	-	-																

#	Level/ Semester	Course Code	Course Title	Credit Hours	Theory Hours		Lab Hours	Program Intended Learning Outcomes (PILOs)															
					Lecture	Exercise		A. Knowledge & Understanding				B. Intellectual Skills				C. Practical Skills				D. Transferable Skills			
								A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4	D1	D2	D3	D4
29	2/2	07.11. 712	Data Structure and Algorithms	3	2	-	2																
30	1/3	07.14. 704	Threats Analysis and Modeling	3	2	-	2																
31	1/3	07.11. 715	Web design and development	3	2	-	2																
32	1/3	07.14. 705	Software Security Development	3	2	-	2																
33	1/3	07.14. 706	Access Control and Identity Management	3	2	-	2																
34	1/3	07.14. 707	Introduction to Digital Forensics	3	2	-	2																
35	1/3	07.14. 708	Security Strategy and Planning	3	3	-	-																
36	2/3	07.14. 709	Information System Security Management	3	3	-	-																
37	2/3	07.14. 710	Ethical Hacking	3	2	-	2																
38	2/3	05.02.720	Research Methodology	2	2	-	-																
39	2/3	07.14. 711	Artificial Intelligence for Cybersecurity	3	2	-	2																
40	2/3	07.14. 712	Personal Privacy and Social Engineering	3	3	-	-																
41	2/3	07.14. 713	Digital forensics laws and professional ethics	3	3	-	-																
42	1/4	07.11. 724	Mobile Application	3	2	-	2																

#	Level/ Semester	Course Code	Course Title	Credit Hours	Theory Hours		Lab Hours	Program Intended Learning Outcomes (PILOs)															
								A. Knowledge & Understanding				B. Intellectual Skills				C. Practical Skills				D. Transferable Skills			
					Lecture	Exercise		A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4	D1	D2	D3	D4
			Development																				
43	1/4	07.14. 714	Network Forensics	**3**	**2**	-	**2**																
44	1/4	07.14. 715	Cybersecurity Operations	**3**	**3**	-	-																
45	1/4	07.14. 716	Elective 1	**3**	**3**	-	-																
46	1/4	07.11. 727	Final Project 1	**3**	**3**	-	-																
47	2/4	07.11. 728	Final Project 2	**3**	**3**	-	-																
48	2/4	07.14. 717	Mobile Forensics	**3**	**2**	-	**2**																
49	2/4	07.14. 718	Elective 2	**3**	**3**	-	-																
50	2/4	07.14. 719	System Components Security and Testing	**3**	**3**	-	-																

Program Intended Learning Outcomes (PILOs): Current Program: B.Sc (CyberSecurity and digital forensics Program Program at 21 UMAS)

A. Knowledge and Understanding:

Upon successful completion of the undergraduate B.Sc (CyberSecurity and digital forensics Program, the graduates will be able to:

A1. Demonstrate an in-depth knowledge of terminology, concepts, methods, principles and theories relaed to the field of cyber security..

A2. Demonstrate a profound knowledge of computing tools, techniques, and methods for solving the real world computing problems.

A3. Identify the user and organizational needs and issues involved in the management and security of digital information and computer technology, and the development and maintenance of secure information systems..

A4. Describe the concepts and techniques to achieve authentication, authorization, access control, and data integrity.

B. Cognitive/ Intellectual Skills:

Upon successful completion of the undergraduate B.Sc (CyberSecurity and digital forensics Program, the graduates will be able to:

B1. Analyze the basic concepts, principles, analytical and mathematical models, algorithms and software tools in the context of cybersecurity.

B2. Select an appropriate range of security protocols, tools, and techniques for providing confidentiality, data protection, data integrity, authentication, non-repudiation, and obfuscation.

B3. Select an appropriate range of tools and technologies to plan, organize, and implement a cyber security project considering human factors, user and organisational requirements.

B4. Evaluate a computing-based solution to meet a given set of computing requirements in the context of cybersecurity discipline.

C. Practical and Professional Skills:

Upon successful completion of the undergraduate B.Sc (CyberSecurity and digital forensics Program, the graduates will be able to:

C1. Apply mathematical foundations, algorithmic principles, cryptography, design and development principles, and computing theory in the modeling and design of security solutions for software or system architecture.

C2. Design, implement, and test a computing-based solution to meet a given set of computing requirements in the context of cyber security

C3. Deploy effectively computing tools and techniques used for the construction and documentation of secure computer applications of varying complexity.Apply current algorithms, methods, and models to develop solutions for real-world problems related to cyber security.

C5. Apply principles, processes, tools and techniques used in mitigating security threats and responding to security incidents**.**

D. General and Transferable Skills:

Upon successful completion of the undergraduate B.Sc (CyberSecurity and digital forensics Program, the graduates will be able to:

D1. Function effectively individually, as a member, or leader of a team engaged in activities appropriate to the cybersecurity program's discipline to accomplish a common goal.

D2. Commit to professional ethics, responsibilities, and norms of professional computing practices.

D3. Communicate effectively in writing and verbally computing and cybersecurity concepts and implications to wide range of audiences.

D4. Engage in continuing professional development and lifelong learning as a computing professional.

Annex- 21, CVs for the Preparation Committee

Attached separately.

Approved by

Dr. Abdulrahman Mohemmed Obaid	Dr. Jamil Saad Hamzah	Dr. Hamzah Ali Abdulrahman Qasem	Dr. Awadh Ali Abdo Mohammed
Department Head	Faculty Dean	Quality Unit	Vice President