SULTAN QABOOS UNIVERSITY
COLLEGE OF SCIENCE
DEPARTMENT OF COMPUTER SCIENCE
BACHELOR OF SCIENCE IN COMPUTER SCIENCE
COURSE OUTLINE

I. COURSE INFORMATION			
COURSE CODE	COMP3502		
COURSE TITLE	**COMPUTER NETWORKS**		
OMAN QUALIFICATION FRAMEWORK (OQF) LEVEL	**7**		
CREDIT HOURS	3		
CONTACT HOURS	4		
PRE-REQUISITES	COMP3203		
CO-REQUISITES			
EQUIVALENT COURSES	COMP4502		
INCOMPATIBLE COURSES			
COURSE CATEGORY	☐ University Requirement	☐ University Elective	
	☐College Requirement	☐ College Elective	
	☐ Department Requirement	☐ Department Elective	
	☒ Major Requirement	☐ Major Elective	
	☐ Specialization Requirement	☐ Specialization Elective	
	☐ Other (specify):		
COURSE OWNER	College: Science	Department: Computer Science	
	Center:	Unit:	
DELIVERY MODE	☒ Face to Face	☐ Blended	☐ Online
COURSE TYPE	☐ Lecture	☒ Lecture/Lab	
	☐ Lecture/Seminar	☐ Lecture/Studio	
	☐ Lecture/Tutorial	☐ Lecture/Lab/Tutorial or Seminar	
	☐Tutorial	☐ Laboratory (Practical)	
	☐ Field or Work Placement	☐ Studio	
	☐Seminar	☐ Internship	
	☐ Workshop	☐ Project	
	☐ Thesis	☐ Other (specify):	
LANGUAGE OF INSTRUCTION	English		
COURSE DESCRIPTION	The course aims to expose students to general aspects of computer networks such as networks hardware, networks performance evaluation, and communication protocols including: physical and data link layer, medium		

	access control, routing, TCP/UDP, and the implementation of networking applications.		
TEACHING AND LEARNING STRATEGIES	☐ Augmented Reality	☐ Flipped Classroom	
	☒ Blended Learning	☐ Problem-Based Learning	
	☐ Discovery-Based Learning	☐ Project-Based Learning	
	☐ Student-Led Learning	☐ Team-Based Learning	
	☐ Work-Based Learning	☐ Other (specify):	
ASSESSMENT COMPONENT AND WEIGHT	☒In-term examination(s) (20%)	☒ Quizzes (5%)	☒Other: Coursera (3%)
	☐ Homework assignments (17%)	☒Project (%)	
	☒ Final examination (40%)	☒ Practical/ Lab (15%)	
TEXTBOOKS AND EDUCATIONAL MATERIAL	• Computer Networks (5th Edition), by Andrew Tanenbaum, Pearson, 2011 • CISCO CISCO Academy CCNA: Introduction to Networks online at netacad.com		
GRADING METHOD	☒ A-F Scale	☐ Pass/Not Pass	☐ Other (specify):

GRADING METHOD DESCRIPTION

	Range	Letter Grade	Description
A-F GRADING SCALE:	90 – 100	A	**Exceptional performance:** All course objectives achieved and met in a consistently outstanding manner.
	86 – 89.9	A-	
	81– 85.9	B+	**Very Good Performance:** The majority of the course objectives achieved (majority being at least two-thirds) and met in a consistently thorough manner.
	77 – 80.9	B	
	73 – 76.9	B-	
	68 – 72.9	C+	**Satisfactory Performance:** At least most of course objectives have been achieved and met satisfactorily.
	64 – 67.9	C	
	60 – 63.9	C-	
	55 – 59.9	D+	**Minimally Acceptable Performance:** The course objectives met at a minimally acceptable level.
	50 – 54.9	D	
	0 – 49.9	F	**Unacceptable performance:** The course objectives not met at a minimally acceptable level.
PASS/NOT PASS:			
OTHER:			

II. SEMESTER INFORMATION

SEMESTER/YEAR		**SECTION(S)**	1
DAY AND TIME		**VENUE(S)**	SCI/0022S
COURSE COORDINATOR	Dr. Shadha Al-Amri	**COURSE TEAM**	-
COORDINATOR OFFICE	0003	**OFFICE HOURS**	Will be announced
COORDINATOR EXTENSION	2246	**COORDINATOR EMAIL**	Sh.alamri@squ.edu.om

III. Alignment of Course Learning Outcomes (CLO), Program Learning Outcomes (PLO), Graduate Attributes (GA), and Oman Qualification Framework (OQF) Characteristics			
CLO	**PLO**	**SQU Graduate Attributes**	**OQF Characteristics**
1. Identify basic communication hardware and software components of a computer network.	1	A	1
2. Describe the services provided at each layer of the network stack.	1	A	1
3. Explain how physical standards, services and network media support communications across data networks.	1,2,3,5	A,B,C,E	1,2,3,4,5
4. Describe operations of the link level protocols including framing, error detection/control and flow control.	1	A,B	1,2
5. Explain network layer services and routing protocols such as (OSPF, RIP).	1,2,5	A,B,E	1,2,4,5
6. Explain Transport Layer Protocols (TCP/UDP).	1	A	1
7. Implement networking applications using sockets.	1,2,5,6	A,B,C,E	1,2,3,4,5
8. Compare between fixed assignment, random access and taking turns Medium Access Control Protocols.	1,2	A,B	1,2
9. Analyze performance of MAC protocols such as FDMA, TDMA, CDMA, ALOHA, Slotted ALOHA, CSMA/CD.	1,2	A,B	1,2

IV. Course Learning Outcomes (CLOs) and Assessment Criteria and Methods (for each CLO)		
CLO1: Identify basic communication hardware and software components of a computer network.		
Assessment Criteria (to achieve this objective, the student must)		**Assessment Methods**
A)	Understand the different applications of computer networks and their benefits.	Quiz #1,Mid-exam, Final,
B)	Discuss networks types and the differences between them.	
C)	Identify the components used to form computer networks.	
D)	Describe the types of data transmission modes.	

CLO2: Describe the services provided at each layer of the network stack.		
ASSESSMENT CRITERIA (TO ACHIEVE THIS OBJECTIVE, THE STUDENT MUST)		**ASSESSMENT METHODS**
A)	Discuss the objectives behind network layering and their functions.	Mid-exam, Final,
B)	Identify the difference between layers and protocols.	
C)	Discuss the OSI and TCP/IP layering models.	
CLO3: Explain how physical standards, services and network media support communications across data networks.		
ASSESSMENT CRITERIA (TO ACHIEVE THIS OBJECTIVE, THE STUDENT MUST)		**ASSESSMENT METHODS**
A)	Describe the purpose and functions of the physical layer.	Assignment#1,Mid-exam, Final, Lab-test
B)	Discuss the concepts and terminologies related to the physical layer.	
C)	Identify the basic characteristics and properties of network media used for data transmissions.	
D)	Connect devices using wired and wireless media.	
CLO4: Describe operations of the link level protocols including framing, error detection/control and flow control.		
ASSESSMENT CRITERIA (TO ACHIEVE THIS OBJECTIVE, THE STUDENT MUST)		**ASSESSMENT METHODS**
A)	List the services and functions of the data link layer.	Mid-exam, Final, Lab-test
B)	Apply the different techniques used by the data link layer (e.g. framing using character count, flow control using sliding window, error detection using CRC, etc.)	
C)	Discuss the ARP concept and apply it in Packet Tracer.	
CLO5: Explain network layer services and routing protocols such as (OSPF, RIP).		
ASSESSMENT CRITERIA (TO ACHIEVE THIS OBJECTIVE, THE STUDENT MUST)		**ASSESSMENT METHODS**
A)	List the services and functions of the network layer.	Mid-exam, Final and Assignment#3 ,Lab-test
B)	Discuss and apply the concept of IP addressing and network subnetting.	
C)	Identify and apply the concept of IP fragmentation and reassembly.	
	Explain the concept of routing and discuss/use/evaluate different routing protocols.	
CLO6: Explain Transport Layer Protocols (TCP/UDP).		
ASSESSMENT CRITERIA (TO ACHIEVE THIS OBJECTIVE, THE STUDENT MUST)		**ASSESSMENT METHODS**
A)	Discuss the functions of the transport layer	Quize#2 and Final
B)	Differentiate between TCP and UDP protocols	
C)	Identify the concept of IP port numbers.	
CLO7: Implement networking applications using sockets.		
ASSESSMENT CRITERIA (TO ACHIEVE THIS OBJECTIVE, THE		**ASSESSMENT METHODS**

STUDENT MUST)		
A)	Discuss the concept of sockets	Assignment#4, Lab Test and Final
B)	Use socket APIs to implement a variety of networking applications.	
CLO8: Compare between fixed assignment, random access and taking turns Medium Access Control Protocols.		
ASSESSMENT CRITERIA (TO ACHIEVE THIS OBJECTIVE, THE STUDENT MUST)		**ASSESSMENT METHODS**
A)	Describe the services of MAC layer.	Assignment#2 , Mid-exam and Final
B)	Differentiate between the categories of MAC protocols and what is the best scenario to use each protocol.	
C)	Apply the concept of collision domain for different network diagram.	
CLO9: Analyze performance of MAC protocols such as FDMA, TDMA, CDMA, ALOHA, Slotted ALOHA, CSMA/CD.		
ASSESSMENT CRITERIA (TO ACHIEVE THIS OBJECTIVE, THE STUDENT MUST)		**ASSESSMENT METHODS**
A)	Discuss and analyze different MAC protocols such as FDMA, CSMA and Alloha.	Assignment#2 , Mid-exam and Final

V. COURSE CONTENT AND SCHEDULE

WEEK	LECTURES #	TOPICS/ SUBJECTS	READINGS/ CHAPTERS	REMARKS (e.g., ASSESSMENTS)
1	1st class	Course Introduction		
	2nd class	• Network Components • Network Representations and Topologies • Common Types of Networks • Internet Connections • Reliable Networks	Ch1:Networking Today	
2	1st class	• Cisco IOS Access • The Command Structure • Basic Device Configuration • Save Configurations • Ports and Addresses • Configure IP Addressing • Verify Connectivity • **Lab: Configure Initial Switch Settings** • **Handout: calculating Latency and maximum data rate**	Ch2:Basic Switch and End Device Configuration	
	2nd class			Assignment #1
3	1st class	• The Rules • Protocols • Protocol Suites • Reference Models • Data Encapsulation • Data Access	Ch3:Protocols and Models	Quiz #1 Coverage

	2nd class	• Purpose of the Physical Layer • Physical Layer Characteristics • Copper Cabling • UTP Cabling • Fiber-Optic Cabling • Wireless Media **Lab:Packet Tracer - Connect a Wired and Wireless LAN**	Ch4:Physical Layer	
4	1st class			
	2nd class	• Purpose of the Data Link Layer • Topologies • Data Link Frame **Handout: Framing, Error Detection and Correction, Flow Control, MAC protocols for shared channels**	Ch6:Data Link Layer	Assignment#2 coverage
5	1st class			
	2nd class			
6	1st class	• Ethernet MAC Address • The MAC Address Table **Lab - View the Switch MAC Address Table**	Ch7:Ethernet Switching	
	2nd class			
7	1st class	• Network Layer Characteristics • IPv4 Packet • IPv6 Packet • How a Host Routes • Router Routing Tables • MAC and IP • ARP • **Lab:Packet Tracer - Examine the ARP Table** • **Handout: Routing protocol algorithm OSPF**	Ch8:Network Layer	
	2nd class			
8	1st class			Mid-exam coverage will be up to ch7
	2nd class	• Configure Initial Router Settings • Configure Interfaces Configure the Default Gateway	Ch9:Basic Router Configuration	
9	1st class	• IPv4 Address Structure • IPv4 Unicast, Broadcast, and Multicast • Types of IPv4 Addresses • Network Segmentation • Subnet an IPv4 Network • Subnet to Meet Requirements • Variable Length Subnet Masking • Structured Design **Lab:Packet Tracer - VLSM Design and Implementation Practice**	Ch10:IPv4 Addressing	Assignment #3 Coverage
	2nd class			
10	1st class			
	2nd class	• ICMP Messages Ping and Traceroute Testing	Ch13:ICMP	
11	1st class	• Transportation of Data • TCP Overview • UDP Overview	Ch14:Transport Layer	Quiz #2 Coverage
	2nd class			

		• Port Numbers • TCP Communication Process • Reliability and Flow Control UDP Communication		
12	1st class	• Application, Presentation, and Session • Peer-to-Peer • Web and Email Protocols • IP Addressing Services • File Sharing Services **Lab: server-client socket programming**	Ch15: Application Layer	Assignment#4 coverage
	2nd class			
13	1st class	Devices in a Small Network Small Network Applications and Protocols Scale to Larger Networks Verify Connectivity Host and IOS Commands Troubleshooting Methodologies Troubleshooting Scenarios	Ch17:Build a Small Network	
	2nd class			
14	1st class			
	2nd class			
15	1st class	Review		
	2nd class			

VI. Additional Information (e.g., Rubrics, etc.)

Assessment Plan:

Coursera (3%), Midterm (20%) Assignments (17%), Lab Test (15%), Quizzes (5%) and Final (40%)

Assessment Component	Posted Date	Due Date	Weight
Assignment# 1	Week 2	Week 3	4%
Quiz# 1	Week 5		3%
Assignment# 2	Week 6	Week 7	4%
Mid Exam	Week8 _ 2nd class		20%
Assignemnt#3	Week 10	Week 11	4%
Quiz#2	Week#12		3%
Assignemnt#4	Week12	Week15	5%
Coursera	Week 5	Week 11	3%
Lab Test	Week 14		15%
Final Exam	19/05/2025 MON 08:00:00 - 10:50:00		**40%**

DEPARTMENT'S LATE SUBMISSION POLICY:

(A) 1-24 hours: 25% of the mark will be deducted.

(B) > 24 hours: not accepted.

DEPARTMENT'S POLICY FOR DEALING WITH CHEATING:

It is essential that each student solves all programming assignments, lab tests and exams individually unless instructed otherwise, e.g., for group projects. Copying, plagiarism, collusion, switching, and falsification are violations of the university academic regulations. Students involved in such acts will be severely penalized. The department has adopted a firm policy on this issue. A zero mark will be assigned the first time a student is caught involved in copying and his/her name will be added to a watch list maintained by the head of department. Further repeated involvements in copying will cause the student to get an f grade in that course. This is in line with the university academic regulations.

VII. STUDENTS RESPONSIBILITIES

It is the student's responsibility to know and comply with all University Academic Regulations relevant to participation in this course. These regulations specifically include attendance requirements and student academic code of conduct.

ACADEMIC INTEGRITY	The University expects the students to approach their academic endeavors with the highest academic integrity. Please refer to the **Undergraduate Academic Regulations**.
ADD AND DROP	Students who wish to drop or add the course should review the **Undergraduate Academic Regulations**.
ATTENDANCE	Sultan Qaboos University has a clear requirement for students to attend courses, detailed in the **Undergraduate Academic Regulations**.
ASSESSMENT AND GRADING	To ensure the provision of a sound and fair assessment and grading, please review the **Undergraduate Academic Regulations**.
GRADE APPEAL	Students who wish to appeal their grades should review the **Undergraduate Academic Regulations**.
CLASSROOM POLICIES	Students are expected to dress professionally during class time as required by the University. Use of phones or any other electronic devices in the classroom during class time is strictly prohibited. Unauthorized use may lead to faculty member confiscation of the device for the remainder of the class. Behavior that persistently or grossly interferes with classroom activities is considered disruptive behavior and may be subject to disciplinary action. A student responsible for disruptive behavior may be required to leave the class.
LATE AND MAKE-UP WORK	Students are required to meet the course objectives by submitting coursework no later than the assigned due date. Students may be allowed to submit late work if approved by the course coordinator. Assignments submitted after the due date may be penalized.
MISSED EVALUATIONS	All quizzes, tests, clinical evaluations, and exams must be completed by the date they are assigned. If a quiz, test, or exam is missed due to a documented emergency situation (e.g., medical emergency, death in the immediate family), it is the student's responsibility to contact the instructor.

Course Outline Appendix

1. PROGRAM LEARNING OUTCOMES / STUDENT OUTCOMES

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 computer science theory and software development fundamentals to produce computing-based solutions.

2. SQU Graduate Attributes and Competencies for Undergraduate Studies

GRADUATE ATTRIBUTES	GRADUATE COMPETENCIES FOR UNDERGRADUATE STUDIES
A. Cognitive Capabilities: The graduate has sufficient general and specialized theoretical knowledge that enables him/her to deal well with his/her specialty and other related fields.	1. Demonstrates familiarity and works with advanced specialized knowledge in the area of specialization.
	2. Demonstrates a general understanding of the relationship of advanced specialized knowledge with knowledge in other relevant professional fields and aspects.
	3. Demonstrates a comprehensive understanding of the theories, principles, and methods used in his/her specialty, and how to create and apply new knowledge.
	4. Demonstrates general knowledge of the legal

	environment and necessary relevant regulatory frameworks.
	5. Shows awareness of contemporary literature and research.
B. Skill and Professional Capability: The graduate has sufficient skill and practical experience that enables him/her to perform all tasks related to the specialization and other related fields.	1. Applies concepts, theories, and investigative methods to synthesize and interpret information to evaluate conclusions.
	2. Applies appropriate research methods and techniques and employs digital knowledge
	3. Evaluates and critiques information independently
	4. Uses cognitive and technical skills to analyze complex issues and develop appropriate solutions.
	5. Initiates new ideas or processes in the professional, educational or research context.
C. Effective Communication: The graduate has the ability to communicate effectively with others to achieve the desired results	1. Explains, presents, and adapts information to suit the recipients.
	2. Employs appropriate information and communication technology to collect and analyze information.
D. Autonomy and Leadership: The graduate has the ability to lead, make decisions and take responsibility for decisions.	1. Performs advanced professional activities independently.
	2. Demonstrates leadership skills.
	3. Takes professional responsibility.
	4. Assumes full accountability for the tasks and their output.
E. Responsibility and Commitment: The graduate appreciates the importance of available resources and deals with them	1. Manages time and other resources assigned to accomplishing tasks effectively and responsibly.
	2. Demonstrates effective practices when working in

effectively and is committed to the ethics of the profession and society.	teams. 3. Demonstrates advanced levels of understanding of values and ethics relevant to the specialization, profession and local and international society and promotes them among others. 4. Works within the professional, institutional, and specialization guiding frameworks and strategic plans. 5. Interacts with community affairs positively and preserves national identity.
F. Development and Innovation: The graduate has a passion for development and innovation in the field of specialization.	1. Demonstrates the ability to independently manage learning tasks, with an awareness of how to develop and apply new knowledge. 2. Utilizes specialized knowledge and skills for entrepreneurship. 3. Utilizes creative and innovative skills in the field of specialization.

3. OQF Characteristics

1. Knowledge
2. Skills
3. Communication, Numeracy, and Information and Communication Technology Skills.
4. Autonomy and Responsibility
5. Employability and Values
6. Learning to learn