COURSE DESCRIPTIONS

Faculty	Faculty of Science and Information Technology				
Department	Networks and Cyber Security Department			**NQF level**	7
Course Title	Data Communication and Networks	**Code**	**509473**	**Prerequisite**	Compiler
Credit Hours	3 Hours	**Theory**	**2**	**Practical**	1
Course Leader	Dr. Saleh Alomari	**email**	omari08@jadara.edu.jo ,		
Lecturers	Dr. Ahlam Jawarneh Dr. Saleh Alomari, Dr. Loi Namrawi, Dr.Tamer Bani Amer, Dr.Marwan Atoom, Dr. Hamzih Smadi Dr. As'ad Alnaser Eng. Mashhoor Beneaiesh	**emails**	ah.jawarneh@jadara.edu.jo, omari08@jadara.edu.jo , l.alnamrawi@jadara.edu.jo, t.baniamer@jadara.edu.jo, m.Atoom@jadara.edu.jo, h.alsmadi2@jadara.edu.jo a.alnaser@jadara.edu.jo m.beneaiesh@jadara.edu.jo		
Lecture time	11:30 am - 14:30 pm	**Classroom**	Block C (Theoretical and practical)		
Semester	1st 2026/2027	**Production**	2010	**Updated**	2026
Type of Teaching	☐ Face to Face ☑ Blended ☐ Online				

Short Description

This course provides a comprehensive understanding of communications architecture, covering major models like OSI and TCP/IP, transmission media, and switching techniques. It combines theoretical concepts with hands-on experience using Cisco Packet Tracer to design, configure, and troubleshoot virtual networks. Students will bridge the gap between protocol theory (routing, addressing, error detection) and practical application (configuring routers, switches, and end devices).

Course Objectives

This course provides a clear description of the concepts of the communications architecture, with particular emphasis on the major Communication Models: Circuit and Packet Switching, OSI and TCP/IP Models and Layers, and Transmission concepts and Protocols. The aim is to present these concepts and protocols in a general setting that is not tied to one particular technology, providing a solid conceptual understanding of the fundamentals of data communications and computer network internetworking, addressing, and routing. Furthermore, the course provides intensive hands-on experience in network design and configuration using Cisco Packet Tracer, enabling students to develop practical skills in configuring, simulating, and troubleshooting computer networks in a virtual environment to reinforce theoretical principles.

Learning Outcomes

A. Knowledge - Theoretical Understanding

a1. Define and explain the basic concepts of data communications, including networking components, topologies, and the interrelationship between packet and circuit switching. **(K1)**

B. Knowledge - Practical Application

a2. Illustrate and contrast the purpose and functionality of the OSI and TCP/IP layered architectures. **(K2)**

C. Skills - Generic Problem Solving and Analytical Skills

b1. Analyze the services and features of various protocol layers in data networks**. (S1)**

D. Skills - Communication, ICT, and Numeracy

b2. Configure basic network device settings, including hostnames, IP addresses, subnet masks, and default gateways on routers and switches. **(S2)**

b3. Utilize Cisco Packet Tracer's Simulation Mode to verify the operation of common network protocols and interpret results to confirm successful communication. **(S3)**

b4. Analyze and troubleshoot network connectivity problems using common utilities like ping and ipconfig within a simulated environment. **(S4)**

E. Competence: Autonomy, Responsibility, and Context

Teaching and Learning Methods

☑ Face to Face Lectures	☑ Brain Storming	☐ Synchronous remote	☑ Asynchronous remote
☑ Using Video	☑ Discussions	☑ Research Project	☑ Case Study
☐ Field visit	☑ Problem solving		

The course will be based on the following teaching and learning activities:

- Lectures covering the theoretical part using PowerPoint presentations
- Case studies
- Review questions
- **Face to face Learning**
- **Asynchronous** class using Jadara E learning system.

Assessment Methods

☑ Formative Assessment	☑ Quiz	☑ Lab Exam	☑ Homework
☑ Project Assessment	☑ Oral Presentation	☑ Midterm	☑ Final Exam

There are four forms of assessment that a teacher can use to evaluate the effectiveness of e-learning:
Initial assessment: It aims to determine the first level of students.
Formative evaluation: It aims to improve the educational process, as it is continuous throughout the learning process with electronic educational situations.
Summative assessment: It aims to discover the strengths and weaknesses in the student's achievement online or.
Final assessment: It takes place at the end of the e-learning program and aims to determine the degree to which students have achieved the main learning outcomes.

Initial assessment: Class disunion with Quiz test using class point

Formative evaluation: Med test, Homework's, assignments

Summative assessment: Minute paper text (Final Exam).Group / Individual Presentation…etc

Week	Hours	CLOs	Topics	Topic Details	Teaching & Learning Methods	Assessment Methods
1	3	a1	**Overview** Chapter 1	Data Communication (Definition., Characteristics and Components), Data flow in communication, Network Definition, Personal, Local, Campus, Metropolitan and Wide Area Network Concepts, Circuit VS. Packet Switching, Protocol Layers and Structure OSI. **Lab 1:** (Networking Today)	Face to face Lecture & discussions	
2+3		a2,b1 ,b2	**Network Models** Chapter 2	which includes the, layered task, Network Models such as OSI, TCP/IP at the all layers in details. Packet switching, Layer Models and protocols) **Lab 2:** Network Components & Devices	Face to face Lecture & discussions	Quizzes 1
4		a1,b1	**Networking and Internetworking Devices** Chapter 15	This chapter explained the details about the all types of the connection at Networking and Internetworking Devices, which include the , Repeaters, Bridges, Routers, Gateways and Routing Algorithms. With more explanation about the responceplity and the Function for all the devices. **Lab 3:** Basic Networking Commands	Face to face Lecture & discussions	**HW #1**
5		a1	**Network Cabling** Chapter 3 CISCO	1. This chapter show the Common network cable types, such as, Coaxial cable, Unshielded twisted pair, and, Fiber optic. 2. Fundemantals of Application Layer Functionality and Protocols (Network Fundamentals – Chapter 3 andra Coleman – CCNA, CCAI) **Lab 4:** Introduction to Cisco Packet Tracer	Face to face Lecture & discussions	
7		a1,a2, b1	**Application Layer** Chapter 25 Chapter 27	1. Application layer concept and structure, processes. dhcp (domain name system), which include the Name Space, Domain Name Space, Distribution Of Name Space, Dns In The Internet, Resolution, Dns Messages, Types Of Records, Registrars, Dynamic Domain	Face to face Lecture & discussions	**+ Quizzes 2**

				Name System (Ddns) And Encapsulation, www and HTTP **Lab5** : Building a Network Topology		
			1st Exam	First exam	First Exam	First Exam
8		**A2,b 1,b2**	**Transport Layer Protocols** Chapter 23	Transport Layer Concepts & Structure, UDP, UDP Ports and processes. Lab 6: **Packet Tracer - Navigating the IOS**	Face to face Lecture & discussions	**students lecture with material and presentations** Padlet link
9		**A2,b 1,b2**	**Transport Layer Protocols** Chapter 23	TCP and communication processes, connection establishment, flow and error control	Face to face Lecture & discussions	**HW #3**
10+11 +12		**A2, b2,b3**	**Network Layer**	Protocols, TCP/IP suite Chapter 8 TCP/IP book, DC&N book	Face to face Lecture & discussions	**Practical lab for each students**
		A2, b2,	**Network Layer**	IPv4, IP Addresses, Public and Private IP Addresses Static and Dynamic IP Addresses		
		A2, b2,b3	**Network Layer**	Network topologies, Subnetting, Routing		
		A2, b2,b3	**Network Layer**	IP Address Resolution, Address Resolution Protocol (ARP), ICMP		
		A2, b2,c1	**Network Layer**	Routing techniques. **Lab 7:** Investigating the TCP/IP and OSI Models in Action		**students lecture** + Presentation
	Mid exam					
13			**Data link Layer** Chapter 10	Error Detection and Correction, LAN Topologies, Ethernet,CSMA/CD	Face to face Lecture & discussions	
14		**A2, b3,c1**	**Multiple Access** Chapter 12	• Multiple access mechanisms • Random access • Controlled access • Channelization **Lab 8:** Create a simple network composing of three routers and two host end devices	Face to face Lecture & discussions	In person Quiz

		A1,b 2,b3	**Physical Layer** Chapter 3 Chapter 4 Chapter 7	Analog & Digital Concepts, Transmission concepts and Tecnologies. **Mini project:** simple network design and simulation	Face to face Lecture & discussions	**Project Presentation and Group discussion**
			Final Exam	**Final Exam**	Final Exam	**Final Exam**

Infrastructure	
Textbook	[1] Data Communication and Networks, 5th Edition, Behrouz Forouzan, McGraw-Hill Science/Engineering/Math, 2013 [2] Sequeira, A. J., & Wong, R. (2024). CCNA 200-301 hands-on mastery with Packet Tracer. Cisco Press.
References	[3] Data Communication and Networks, 4th Edition, Behrous A. Forouzan, Publisher: McGraw-Hill, 2007. [4] TCP/IP Protocol Suite, 3rd Edition, Behrous A. Forouzan, Publisher: McGraw Hill, 2006 [5] Cisco Networking Academy. (2024). Introduction to networks labs and study guide (CCNAv7). Pearson / Cisco Press.
Learning Activates	1. Lectures 2. Collaborative learning 3. Flipped learning
Learning Environments	1. Asynchronous class using Jadara E learning system.
Required reading	
Electronic materials	
Other	[6] Data & Computer communications: W. Stallings, Prentice Hall, Seventh Edition, 2004. [7] Computer Networking A Top down Approach Featuring the Internet, 3rd Edt., James H. Kurose and Keith W. Ross, Publisher: Addison Wesley, 2005 [8] Internetworking with TCP/IP Vol. I: Principles, Protocols, and Architecture, Douglas Comer, Prentice Hall, 4th edition Vol. 1 (February 22, 2000 [9] Computer Networks A Systems Approach, 3rd Edit. Larry L. Peterson and Bruce S. Davie, Publisher: Morgan Kaufmann, 2003.

Course Assessment Plan							
Assessment Method	**Grade**	**CLOs**					
		a1	**a2**	**b1**	**b2**	**b3**	b4
Midterm	30%	15%	9%	6%	0%	0%	
Second (if applicable)	0%	0%	0%	0%	0%	0%	
Final Exam	40%	6%	8%	8%	9%	9%	

Lab work								
Coursework assessment methods	Assignments	10 %	0%	0%	5%	0%	5%	
	Case study	0%	0%	0%	0%	0%	0%	
	Discussion and interaction							
	Group work activities	0%	0%	0%	0%	0%	0%	
	Lab tests and assignments	10%	5%	0%	0%	5%	0%	
	Presentations	0%	0%	0%	0%	0%	0%	
	Quizzes	10%	5%	0%	0%	5%	0%	
Total		100%	31	17	19	19	14	

Plagiarism

Plagiarism is claiming that someone else's work is your own. The department has a strict policy regarding plagiarism and, if plagiarism is indeed discovered, this policy will be applied. Note that punishments apply also to anyone assisting another to commit plagiarism (for example by knowingly allowing someone to copy your code).
Plagiarism is different from group work in which a number of individuals share ideas on how to carry out the coursework. You are strongly encouraged to work in small groups, and you will certainly not be penalized for doing so. This means that you may work together on the program. What is important is that you have a full understanding of all aspects of the completed program. In order to allow proper assessment that this is indeed the case, you must adhere strictly to the course work requirements as outlined above and detailed in the coursework problem description. These requirements are in place to encourage individual understanding, facilitate individual assessment, and deter plagiarism.