جمهورية مصر العربية
وزارة التعليم العالي والبحث العلمي
Ministry of Higher Education and Scientific Research

SH. A.
أكاديمية الشروق

المعهد العالى للحاسبات وتكنولوجيا المعلومات
مدينة الشروق - القاهرة
شعبة علوم الحاسب

Course specification

Course Code: CS 250

Course Title: Computer Networks

Academic Year: /

Course specification
(CS 250 - Computer Networks)

Course Outline	
Faculty:	*HICIT- (**Higher Institute for Computers & Information Technology**-El Shorouk Academy)*
Programme(s) on which the course is given:	Undergraduate program in Computer Science
Major or minor element of programme:	Compulsory
Department offering the program	Department of Computer Science
Department offering the course:	Department of Computer Science
Level	Third Level
Date of specification approval	DD/MM/2023

Basic Information				
Code:	CS 250	***Title:***	Computer Networks	
Prerequisites:		CS 220 Computer Organization		
Weekly Hours:				
Lecture: 2		**Exercise: -**	**Practical :** 2	**Total:** 3 credit hours

Professional Information

Course Aims:

Upon successful completion of the course, students should be:

- understand the fundamental concepts of computer network
- understand the OSI and TCP/IP models
- understand Computer network architecture and its layers

a18	Identify the methods used in defining and assessing criteria for measuring the extent to which a computer system is appropriate for its current deployment and future evolution.
a19	Recognize the current and underlying technologies that support computer processing and inter-computer communication.
a21	Identify Modeling and design of computer-based systems bearing in mind the trade-offs
b1	Define traditional and non-traditional problems, set goals towards solving them, and observe results.
b2	Perform comparisons between (algorithms, methods, techniques, etc.).
b4	Identify attributes, components, relationships, patterns, main ideas, and errors.
b5	Summarize the proposed solutions and their results.
b13	Analyze and evaluate a range of options in producing a solution to an identified problem.
b16	Define and assess criteria to measure the appropriateness of a computer system for its current deployment and future evolution, and to interpret the results thereof.
c6	Evaluate systems in terms of general quality attributes and possible trade-offs presented within the given problem.
c9	Identify any risks or safety aspects that may be involved in the operation of computing equipment within a given context.
c10	Deploy effectively the tools used for the construction and documentation of software, with particular emphasis on understanding the whole process involved in using computers to solve practical problems.
c14	Operate computing equipment efficiently, taking into account its logical and physical properties.
d5	Demonstrate efficient IT capabilities.

Program ILOs Covered by Course			
Knowledge and understanding	**Intellectual Skills**	**Professional and practical skills**	**General and Transferable skills**
A18, A19, A21	B1, B2, B4, B5, B13, B16	C6, C9, C10, C14	D5

Intended learning outcomes of course (ILOs)

a. Knowledge and Under-Standing:

a1. Define data communication and networking concepts. [A19]
a2. Explain the computer networks' standards, protocols (OSI and Internet reference models).[A18-A19]
a3. Clarify principles, concepts and protocols of computer network design and building. [A19-A21]

b. Intellectual Skills:

b1. Interpret internetworking concepts, architecture, and protocols. [B1, B13]
b2. Compare between alternative computer networ design approaches. [B2, B5]
b3. Analyze network protocols designs. [B4, B13]
b4. Illustrates the differences of protocols and architectures. [B1, B2, B4]
b5. Discuss various network architectures and protocols. [B4, B5, B16]

c. Professional and practical skills

c1. Measure the values of protocol parameters and indicate their advantages and disadvantages. [C6, C9, C10, C12]

d. General and transferable skills

d1. Work effectively as an individual and as a member of a team. [D5]
d2. Write technical Report. [D5]

Contents		
Topic	**Contact Hours**	
	lecture	**Lab**
Chapter 1. Computer Network Basics 1.1. Uses of Computer Networks 1.2. Network Hardware 1.3. Network Software 1.4. Reference Models 1.5. Example Networks 1.6. Network Standardization	4	4
Chapter 2: The Physical Layer 2.1. The Theoretical Basis for Data Communication 2.2. Guided Transmission Media 2.3. Wireless Transmission 2.4. Communication Satellites 2.5. The Public Switched Telephone Network 2.6. The Mobile Telephone System 2.7. Cable Television	6	6
Chapter 3 The Data Link Layer 3.1. Data Link Layer Design Issues 3.2. Error Detection and Correction 3.3. Elementary Data Link Protocols 3.4. Sliding Window Protocols 3.5. Protocol Verification 3.6. Example Data Link Protocols	4	4
Chapter 4 The Medium Access Control Sub layer 4.1. The Channel Allocation Problem 4.2. Multiple Access Protocols 4.3. Ethernet 4.4. Wireless LANs 4.5. Broadband Wireless 4.6. Bluetooth 4.7. Data Link Layer Switching	4	4
Chapter 5. The Network Layer 5.1. Network Layer Design Issues 5.2. Routing Algorithms 5.3. Congestion Control Algorithms 5.4. Quality of Service 5.5. Internetworking 5.6. The Network Layer on the Internet	4	4
Chapter 6. The Transport Layer 6.1. The Transport Service 6.2. Elements of Transport Protocols 6.3. A Simple Transport Protocol 6.4. The Internet Transport Protocols: UDP	4	4

6.5. The Internet Transport Protocols: TCP 6.6. Performance Issues		
Chapter 7. The Application Layer 7.1. DNS—The Domain Name System 7.2. Electronic Mail 7.3. The World Wide Web 7.4. Multimedia	4	4
Selected Topic (Firewall)	2	2

Teaching and learning methods	
Teaching and learning methods	**Used**
Lectures	√
Tutorial Exercises	√
Practical Lab	
Exercises	-
Discussions.	√
Self – Learning (Reading material, Websites search,)	√
Self-studies	
Group work	√
Presentation	
Problem solving/problem solving learning based	
Case study	
Synchronous E-Learning	√
Video lectures	-
Asynchronous E-Learning	√

Student assessment methods & Schedule		
Methods	**Used**	**Week#**
Midterm Exam	√	**8**
Final Exam	√	**16**
Course Project	√	**3-14**
Course Work & Quizzes	√	**2-14**
Practical Exam	√	**15**

Assessment Weight	
Assessment	Weight %
Mid Term Exam	5%
Practical Exam and Project	20%
Final Exam	70%
Course Work & Quizzes	5%
Total	100

Course Work &Quizzes
Short Exams, Assignments, Research, Reports, Presentations
Class/Project discussion

List of references	
Essential books (textbooks)	Tanenbaum, Andrew S., and Nickolas Feamster. Computer Networks. 2020.
Course notes	[https://ceng393.cankaya.edu.tr/course.php?page=Lecture%20Notes] [https://mrcet.com/downloads/digital_notes/CSE/III%20Year/COMPUTER%20NETWORKS%20NOTES.pdf]
Recommended books	Peterson, Larry L., and Bruce S. Davie. Computer Networks: A Systems Approach. Morgan Kaufmann, 2021.
Periodicals, website	PowerPoint presentations of all course materials All labs material [https://moodle.sha.edu.eg/course/view.php?id=2260]
Videos link	

Required Facilities		
Tools & SW (Technology facilities):	- Microsoft SQL server 2019 platform - Microsoft Visual Studio 2019 and ADO.NET to connect database with c# code. - Microsoft TEAMS to create virtual classrooms for lectures, discussions for project. - Academy Portal (MOODLE) to make electronic quizzes and electronic midterm exam. - Academy Portal (MOODLE) to upload project deliverable and assignment. - Academy portal (MOODLE) to upload electronic material.	
Teaching facilities:	Whiteboard	√
	Computer Lab	√
	Data show	√
	E-Learning	√
	Videos	√
	Website	√

Course Content/ILO Matrix											
Course Contents	**Knowledge & understanding**			**Intellectual skills**					**Professional and practical skills**	**General**	
	a1	**a2**	**a3**	**b1**	**b2**	**b3**	**b4**	**b5**	**c1**	**d1**	**d2**
1 Computer Network Basics	x			x	x						
2 The Physical Layer	x	x		x			x	x			
3 The Data Link Layer	x	x		x			x	x			
4 The Medium Access Control Sub layer		x	x		x	x	x	x	x		
5 The Network Layer		x	x		x	x		x	x		
6 The Transport Layer			x	x	x	x		x	x		
7 The Application Layer			x	x	x	x		x	x		
Course project									x	x	x

Learning Method /ILOs Matrix											
Learning Methods	**Knowledge and understanding**			**Intellectual skills**					**Professional and practical skills**	**General**	
	a1	**a2**	**a3**	**b1**	**b2**	**b3**	**b4**	**b5**	**c1**	**d1**	**d2**
Lectures	X	x	x	x	x	x	x	x	x		
Tutorial Exercises				x	x	x	x	x	x		
Practical Lab				x	x	x	x	x	x		
Discussions.				x	x	x	x	x	x	x	x
Reading material	X	x	x								
Problem solving						x	x				
Group work									x	x	x
Case study				x		x	x		x		
Research and reporting				x	x	x	x		x		
Websites search											
Video lectures											
E-Learning	X	x	x	x	x	x	x	x			

Assessment Methods /ILOs Matrix										
Assessment Methods	**Knowledge & understanding**		**Intellectual skills**					**Professional & practical skills**	**General**	
	a1	**a2**	**b1**	**b2**	**b3**	**b4**	**b5**	**c1**	**d1**	**d2**
Mid Term Exam	x	x	x	x	x	x	x			
Final Exam	x	x	x	x	x	x	x			
Course Project	x	x	x	x	x	x	x	x	x	x
Course Work &Quizzes	x	x	x	x	x	x	x	x	x	x
Practical Exam				x	x	x	x	x		

Course ILOs Vs Program ILOs															
Prog ILOs / Course ILOs		Knowledge & understanding			Intellectual skills						Professional and practical skills				General
		A18	A19	A21	B1	B2	B4	B5	B13	B16	C6	C9	C10	C12	D5
Knowledge and Understanding	a1		√												
	a2	√	√												
	a3		√	√											
Intellectual skills	b1				√				√						
	b2					√									
	b3							√							
	b4				√	√	√		√						
	b5						√	√							
Professional and practical skills	c1										√	√	√	√	
General skills	d1														√
	d2														√

Course Coordinator: Dr. Farouk Shabaan **( )**
Head of Department: Dr. Ahmed El-Abbassy **( )**
Date: --/--/2023