

# Republic of Yemen

Ministry of Higher Education & Scientific Research

Council of Academic Accreditation & Quality Assurance of Higher  
Education(CAQA)

21 September University for Medical and  
Applied Sciences



Faculty of Engineering and Computer  
Department of Information Technology

Program of Information Technology

Course Specification of

Computer Network

Course Code. (07.01. 708)

2024



T4: This Template is Developed and Approved by CAQA-Yemen, 2023

Prepared by:

Assoc. Prof. Farouk Al-  
Fahaidy

Reviewed by:

Dr. ----

Head of the Department:

Quality Unit:

Dean

## I. General Information:

1.	Course Title:	Computer Network				
2.	Course Code:	07.01. 708				
3.	Credit Hours:	Credit Hours	Theory Contact Hours		Practical Contact Hours	
			Lecture	Tutorial/ Seminar	Lab	Clinical
		3	2	--	2	--
4.	Level/ Semester at which this Course is offered:	2nd Level / 2nd Semester				
5.	Pre –Requisite (if any):	Introduction to Information Technology (07.01. 701)				
6.	Co –Requisite (if any):	-----				
7.	Program (s) in which the Course is Offered:	Bachelor of Medical Information Technology				
8.	Language of Teaching the Course:	Mixed (English + Arabic)				
9.	Location of Teaching the Course:	Faculty of Medical Technology				
10.	Prepared by:	Assoc. Prof. Farouk Al-Fahaidy				
11	Date and Number of Approval by Council:					

## II. Course Description:

This course aims to provide students with basic principles and concepts related to data communications and networking design, simulation & implementation. Computer networks have raised demands in variant environmental applications, like social, medical, IoT, industries and marketing environments. Topics of the course include fundamentals of data communications and networking, networks models, multiplexing and transmission media, switching, network layers protocols and networks design, transport layer protocols and network management. This course is supported with practical lab experiments & computer-based lap works which develop student's practical & problem-solving skills related to network design, simulation, implementation and installation to different environmental contexts including medical environment.

III. Course Intended Learning Outcomes (CILOs) : Upon successful completion of the course, students will be able to:		Referenced PILOs	
A. Knowledge and Understanding:		I, P or M/A	
a1	Define terminologies related to computer networks such as network main H/W & S/W components, characteristics, topology types, models, standards, protocols, addressing, casting types, problems, management, ... etc.	I	A1 Demonstrate an understanding of appropriate models, theories, mathematical foundations, and techniques related to Health Information Technology discipline.
a2	Demonstrate the computer network applications and fundamentals such as, protocol layering and operation, switching types and operation, error detection and correction mechanisms, addressing, casting operation, areas of network management, ... etc.	I	A2 Identify user and Healthcare needs to provide IT based solutions to real-world problem. <b>A4. Demonstrate a sound understanding the computing concept related to analysis, design, implementation, and evaluation of Health information system.</b>
			A3 Demonstrate a profound knowledge in utilizing and

				adapting IT tools, techniques, practices, and methods for solving computing problems in Health environment.
<b>B. Intellectual Skills:</b>				
b1	Compare between the computer networks protocol types, topology types, switching methods, mechanisms of error detection and correction, logical addressing protocols, casting types and management tools, in terms of merits and drawbacks.	P	B1	<b>B1.</b> Critically analyse complex computing problems and propose appropriate information technology based solutions and integrate them effectively into the uses and organization Health. <b>B4.</b> Evaluate IT based solution to meet a given set of Health requirements in the context of Health Information Technology discipline.
b2	Select the appropriate computer network topology, type, protocols, switching method and associated switch, mechanism of error detection and correction, and management tool considering desired issues and applications.	M	B2	Analyze the impacts of computing on Health objectives and customer needs, and consider them during the analytical processing, selection, integration, configuration and administration of information systems
			B3	Explore variety of challenges and problems related to Health Information Technology to select the optimal solution.
<b>C. Professional and Practical Skills:</b>				
c1	Apply the theoretical concepts and practical skills in building of a computer network to different contexts, using the essential computer and communications H/W and S/W components.	P	C1	Employ effectively the concepts, principles of computational tools, techniques used for the construction and documentation of Health Information of varying complexity.

c2	Use standard laboratory instruments and computer-based simulation for configuration and analyzing of the computer network operation and features.	P	C2	Design, implement, and test a computing-based solution to meet a given set of computing requirement in the context of Health Information Technology.
			C3	Use systematic approaches to select, develop, apply integrates, and administrate secure computing technologies to accomplish user and Health goals.
			C4	Use current techniques, skills, and tools necessary for computing practices.
<b>D. Transferable Skills:</b>				
d1	Work effectively as a member or a leader of a team by sharing ideas and practices skills throughout lab-work and the preparation of course-projects & reports related to the construction and configuration of network's solutions for different contexts including Health Information Technology discipline.	P	D1	Function effectively as an individual, as a member, or leader of a team engaged in activities appropriate to the Health Information Technology discipline to accomplish a common goal.
d2	Consider professional ethics, responsibilities, and organizational & social norms of professional networks practices.	A	D2	Commit to professional ethics, responsibilities, and norms of professional IT practices.
			D4	Engage in continuing professional development and lifelong learning as an IT professional.
I= Introduced, P=Practiced or M/A= Mastered/Advanced				

(A) Alignment of Course Intended Learning Outcomes (Knowledge and

Understanding) to Teaching Strategies and Assessment Methods:			
	Course Intended Learning Outcomes	Teaching Strategies	Assessment Strategies
a1	Define terminologies related to computer networks such as network main H/W & S/W components, characteristics, topology types, models, standards, protocols, addressing, casting types, problems, management, ... etc.	<ul style="list-style-type: none"> <li>▪ Active Lectures,</li> <li>▪ Interactive class discussions,</li> <li>▪ Exercises and Home Works.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Written exams,</li> <li>▪ Assignment work,</li> <li>▪ Quizzes,</li> <li>▪ Reports submission.</li> </ul>
a2	Demonstrate the computer network applications and fundamentals such as, protocol layering and operation, switching types and operation, error detection and correction mechanisms, addressing, casting operation, areas of network management, ... etc.	<ul style="list-style-type: none"> <li>▪ Active Lectures,</li> <li>▪ Interactive class discussions,</li> <li>▪ Exercises and Home Works.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Written exams,</li> <li>▪ Assignment work,</li> <li>▪ Quizzes,</li> <li>▪ Reports submission.</li> </ul>
a3		<ul style="list-style-type: none"> <li>▪</li> </ul>	<ul style="list-style-type: none"> <li>▪</li> </ul>
		<ul style="list-style-type: none"> <li>▪</li> </ul>	<ul style="list-style-type: none"> <li>▪</li> </ul>
		<ul style="list-style-type: none"> <li>▪</li> </ul>	<ul style="list-style-type: none"> <li>▪</li> </ul>
(B) Alignment of Course Intended Learning Outcomes (Intellectual Skills) to Teaching Strategies and Assessment Methods:			
	Course Intended Learning Outcomes	Teaching Strategies	Assessment Strategies
b1	Compare between the computer networks protocol types, topology types, switching methods, mechanisms of error detection and correction, logical addressing	<ul style="list-style-type: none"> <li>▪ Active Lectures,</li> <li>▪ Interactive Class Discussions,</li> <li>▪ Laboratory based session,</li> <li>▪ Problem-solving,</li> <li>▪ Exercises and Home Works,</li> <li>▪ Group work,</li> <li>▪ Presentation,</li> <li>▪ Project.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Written exams,</li> <li>▪ Practical exam,</li> <li>▪ Project,</li> <li>▪ Assignment,</li> <li>▪ Assignment work.</li> </ul>

	protocols, casting types and management tools, in terms of merits and drawbacks.		
b2	Select the appropriate computer network topology, type, protocols, switching method and associated switch, mechanism of error detection and correction, and management tool considering desired issues and applications.	<ul style="list-style-type: none"> <li>▪ Active Lectures,</li> <li>▪ Interactive Class Discussions,</li> <li>▪ Laboratory based session,</li> <li>▪ Problem-solving,</li> <li>▪ Exercises and Home Works,</li> <li>▪ Group work,</li> <li>▪ Project.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Written exams,</li> <li>▪ Practical exam,</li> <li>▪ Project,</li> <li>▪ Assignment,</li> <li>▪ Case studies,</li> <li>▪ Assignment work.</li> </ul>
	...	▪	▪
		▪	▪
		▪	▪
<b>(C) Alignment of Course Intended Learning Outcomes (Professional and Practical Skills) to Teaching Strategies and Assessment Methods:</b>			
	<b>Course Intended Learning Outcomes</b>	<b>Teaching Strategies</b>	<b>Assessment Strategies</b>
c1	Apply the theoretical concepts and practical skills in building of a computer network to different contexts, using the essential computer and communications H/W and S/W components.	<ul style="list-style-type: none"> <li>▪ Active Lectures,</li> <li>▪ Interactive Class Discussions,</li> <li>▪ Laboratory-based session,</li> <li>▪ Exercises and Home Works,</li> <li>▪ Project,</li> <li>▪ Group work.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Written exams,</li> <li>▪ Quizzes,</li> <li>▪ Practical exam,</li> <li>▪ Assignment,</li> <li>▪ Report submission.</li> </ul>
c2	Use standard laboratory instruments and computer-based simulation for configuration and analyzing of the computer network operation and features.	<ul style="list-style-type: none"> <li>▪ Interactive Class Discussions,</li> <li>▪ Laboratory-based session,</li> <li>▪ Exercises and Home Works,</li> <li>▪ Project,</li> <li>▪ Group work.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Quizzes,</li> <li>▪ Practical exam,</li> <li>▪ Assignment,</li> <li>▪ Report submission.</li> </ul>
	...	▪	▪
		▪	▪

(D) Alignment of Course Intended Learning Outcomes (Transferable Skills) to Teaching Strategies and Assessment Methods:			
	Course Intended Learning Outcomes	Teaching Strategies	Assessment Strategies
d1	Work effectively as a member or a leader of a team by sharing ideas and practices skills throughout lab-work and the preparation of course-projects & reports related to the construction and configuration of network's solutions for different contexts including Health Information Technology discipline.	<ul style="list-style-type: none"> <li>▪ Group work,</li> <li>▪ Directed Self-study,</li> <li>▪ Exercises and Home Works,</li> <li>▪ Seminar/ project/presentation,</li> <li>▪ Laboratory based session,</li> <li>▪ Project.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Project presentation,</li> <li>▪ Laboratory exam,</li> <li>▪ Assignment,</li> <li>▪ Report/Project</li> </ul>
d2	Consider professional ethics, responsibilities, and organizational & social norms of professional networks practices.	<ul style="list-style-type: none"> <li>▪ Group work,</li> <li>▪ Directed Self-study,</li> <li>▪ Exercises and Home Works,</li> <li>▪ Seminar/ project/presentation,</li> <li>▪ Laboratory based session,</li> <li>▪ Project.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Project presentation,</li> <li>▪ Laboratory exam,</li> <li>▪ Assignment,</li> <li>▪ Report/Project</li> </ul>
	...	▪	▪

#### IV. Course Contents:

##### A. Theoretical Aspect:

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
1	Course Orientation and Introduction	<ul style="list-style-type: none"> <li>– Course Orientation and General Information,</li> <li>– Course Intended learning outcomes (ILOs),</li> <li>– Data Communications,</li> <li>– Networks,</li> <li>– Network Types &amp; Topologies,</li> <li>– Internet History,</li> </ul>	1	2	a1, b1, b2

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
		– Standards, Protocols and Administration.			
2	Network Models	– The ISO/OSI model, – Protocol Layering, – TCP/IP Protocol Suite.	1	2	a1, a2, b1, b2
3	Multiplexing & Transmission Media	– Basic Concepts & terminologies, – Introduction to Multiplexing, – Analog Multiplexing, – Digital Multiplexing, – Transmission Medias: Guided & Un-Guided Transmissions media, – Wired, Wireless & Optical transmission Media.	2	4	a2, b1, b2, c1
4	Switched WAN Networks	– Introduction to internetworking elements and device, Hubs, Bridges, Switches & Routers, – Circuit-Switched Networks, – Packet-Switched Networks, – Virtual Circuit Switched Networks, – Structure of Switches & Routers.	2	4	a1, a2, b1, b2, c1
5	Data-Link Layer	– Introduction to Data-Link Layer, IEEE802.3 Frame Header & Addressing, – Media Multiple Access Methods.	1	2	a1, a2, b1, b2
6	Mid-term Theoretical Exam	– All Previous Topics	1	2	a1, a2, b1, b2, c1
7	Error Detection and Correction	– Introduction to Coding, – Line & Block Coding, – Cyclic Codes, – Checksum, – Forward Error Correction, – ARQ Protocol.	1	2	a1, a2, b1, b2
8	Network Layer Protocols	– Introduction and comparisons between Internet Protocols, IPv4 & IPv6, – IPv4 Class-full & Classless Addressing, and Address Depletion Problem,	3	6	a2, b1, b2, c1

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
		<ul style="list-style-type: none"> <li>– Sub-networking and Network Design,</li> <li>– Network Design and IP's Distributions illustration for some organization,</li> <li>– ICMPv4,</li> <li>– ARP &amp; RARP,</li> <li>– Static &amp; Dynamic Assignment of IP: DHCP work,</li> <li>– MOBILE IP,</li> <li>– IPv4 vs. IPv6 Headers.</li> </ul>			
9	<b>Multicast Routing</b>	<ul style="list-style-type: none"> <li>– Multicasting Basic,</li> <li>– Intradomain Multicast Protocols,</li> <li>– Interdomain Multicast Protocols,</li> <li>– IGMPv4,</li> <li>– OSPF Protocol.</li> </ul>	1	2	b1, b2, c1
10	<b>Transport Layer Protocols and Network Management &amp; Security</b>	<ul style="list-style-type: none"> <li>– Introduction,</li> <li>– User datagram protocol (UDP),</li> <li>– Transmission control Protocol (TCP), and STCP</li> <li>– Introduction, SNMP, ASN.1,</li> <li>– Introduction to Confidentiality, Other aspects of security.</li> </ul>	2	4	b1, b2, c1
11	<b>Final Theoretical Exam</b>	<ul style="list-style-type: none"> <li>– ALL Topics</li> </ul>	1	2	a1, a2, b1, b2, c1
<b>Number of Weeks /and Units Per Semester</b>			<b>16</b>	<b>32</b>	

#### B. Practical Aspect (Lab/Clinical):

No.	Tasks/ Experiments	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
1	<b>Lab Orientations: Presentation of lab topics, Simulation tool (Packet Tracer+ GNS3+Wireshark+VMware+PowerSNMP), and lab terminal nodes (PCs, laptops, ... etc.).</b>	1	2	c2, d1

No.	Tasks/ Experiments	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
2	<p><b>Network passive and active devices: while passive devices include</b> Guided (wired) like twisted-par, coaxial cable and fiber-optic cable. Unguided (wireless) like radio wave, microwave and infrared, active devices include switches, bridges, repeater, hubs, routers, wireless access points, firewalls, ... etc.</p> <ul style="list-style-type: none"> <li>- Network's cables &amp; RG45 Connectors and its installation on coaxial cable</li> </ul>	2	4	c1, c2, d1
3	<ul style="list-style-type: none"> <li>- Addressing: MAC addressing, IP addressing (with different classes), private IP addressing, etc...</li> </ul>	1	2	b1, b2, c1, c2, d1
4	<ul style="list-style-type: none"> <li>- Subnetting and VLSM: Basics, Subnetting Class C Addresses, Subnetting Class B Addresses, Subnetting Class A Addresses, Variable Length Subnet Masks (VLSMs).</li> </ul>	1	2	b1, b2, c1, c2, d1
5	<ul style="list-style-type: none"> <li>- Configuration: Router Interfaces, implementing a Topology Using Packet Tracer, Some of Router Modes, Configurations Commands, Verification Commands.</li> </ul>	1	2	b2, c1, c2, d1
6	<ul style="list-style-type: none"> <li>- Switching: Configuring VLANs, Routing between VLANs, Verification Commands, Issue to Solve.</li> </ul>	1	2	b2, c1, c2, d1
7	<ul style="list-style-type: none"> <li>- Static Routing: Introduction, Pros and Cons, WAN Components, The Scenario, Configurations Commands, Verification Commands.</li> </ul>	1	2	b1, b2, c1, c2, d1
8	<ul style="list-style-type: none"> <li>- Dynamic Routing: Introduction, Pros and Cons, The Configurations (RIP, EIGRP, OSPF), Verification commands.</li> </ul>	1	2	b2, c1, c2, d1
9	<ul style="list-style-type: none"> <li>- Servers and Protocols: HTTP, DNS, DHCP, Email, TFTP, Servers Testing, Router as DHCP Server, Telnet, Useful Command.</li> </ul>	1	2	b2, c1, c2, d1

No.	Tasks/ Experiments	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
10	- Network Management: SNMP Protocol.	1	2	b2, c1, c2, d1, d2
11	- Network implementation: implement variant synthesized LAN networks using necessary H/W and S/W.	2	4	a1, a2, b1, b2, c1, c2, d1, d2
12	- Project Submission & Presentations	1	2	a1, a2, b1, b2, c1, c2, d1, d2
13	- Final Practical Exam.	1	2	b1, b2, c1, c2, d1
Number of Weeks /and Units Per Semester		15	30	

C. Tutorial Aspect (if any):

No.	Tutorial	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
1	NONE			
2				
3				
4				
5				
6				
7				
8				

No.	Tutorial	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
9				
10				
11				
12				
13				
14				
Number of Weeks /and Units Per Semester				

## VII. Assignments & Reports:

No.	Assignments	Week Due	Mark	Aligned CILOs (symbols)
1	<b>Assignment 1:</b> Network Types & Topologies and Networking Models, and Transmissions Media. <b>Report 1:</b> Multiplexing in Telephone & Mobile Networks.	3rd – 6th	4	a1, a2, b1, b2 d1
2	<b>Assignment 2:</b> Switching & Error Detection & Corrections. <b>Report 2:</b> WAN Switching like MPLS Protocol.	7th – 10 <sup>th</sup>	4	a2, b2, c1, c2, d1, d2
3	<b>Assignment 3:</b> subnetting, Inter/intra-routing & configuration with Lab Reports	11th	4	a1, a2, b1, b2, c1, c2, d1, d2
4	<b>Report 3:</b> Network Advanced Technologies.	13th	3	b1, b2, c1, c2, d1, d2
Total			15	

### VIII. Schedule of Assessment Tasks for Students During the Semester:

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment	Aligned Course Learning Outcomes
1	Assignments & Reports	3 <sup>rd</sup> – 13 <sup>th</sup>	15	10%	a1, a2, b1, b2, c1, c2, d1, d2
2	Quizzes 1 & 2	6 <sup>th</sup> & 11 <sup>th</sup>	10	6.67%	a1, a2, b1, b2, c1, d1
3	Mid-Term Theoretical Exam	8 <sup>th</sup>	20	13.33%	a1, a2, b1, b2, c1
4	Final Practical Exam including Project Presentation & Evaluation	14 <sup>th</sup> & 15 <sup>th</sup>	30	20%	a1, a2, b1, b2, c1, c2, d1, d2
5	Final Theoretical Exam	16 <sup>th</sup>	75	50%	a1, a2, b1, b2, c1
Total			150	100%	

### IX. Learning Resources:

- *Written in the following order:* Author, Year of publication, Title, Edition, Place of publication, Publisher.

#### 1- Required Textbook(s) (maximum two):

- 1- Behrouz A. Forouzan, 2018, "Data and computer Communications", 8th Edition, USA.
- 2-

#### 2- Essential References:

- 1- William Stallings, 2007 "Data Communications and networking", 10th Edition, Pearson Prentice Hall.
- 1- .....
- 2- .....

#### 3- Electronic Materials and Web Sites etc.:

##### Websites:

- 1- **Text Book and Chapter's notes:** [www.mhhe.com/forouzan](http://www.mhhe.com/forouzan)

2- .....

3- ....

**Journals:**

1- .....

2- .....

**Other Web Sources:**

1.....

2. MIT Courses: <http://www.courses.mit.com>

## X. Course Policies: (Based on the Uniform Students' By law (2007))

1	<b>Class Attendance:</b> Class Attendance is mandatory. A student is considered absent and shall be banned from taking the final exam if his/her absence exceeds 25% of total classes.
2	<b>Tardiness:</b> A student will be considered late if he/she is not in class after 10 minutes of the start time of class.
3	<b>Exam Attendance/Punctuality:</b> No student shall be allowed to the exam hall after 30 minutes of the start time, and shall not leave the hall before half of the exam time has passed.
4	<b>Assignments &amp; Projects:</b> Assignments and projects must be submitted on time. Students who delay their assignments or projects shall lose the mark allocated for the same.
5	<b>Cheating:</b> Cheating is an act of fraud that results in the cancelation of the student's exam or assignment. If it takes place in a final exam, the penalties stipulated for in the Uniform Students' Bylaw (2007) shall apply.
6	<b>Forgery and Impersonation:</b> Forgery/Impersonation is an act of fraud that results in the cancelation of the student's exam, assignment or project. If it takes place in a final exam, the penalties stipulated for in the Uniform Students' Bylaw (2007) shall apply.
7	<b>Other policies:</b> The University official regulations in force will be strictly observed and students shall comply with all rules and regulations of the examination set by the Department, Faculty and University Administration.



## Faculty of Medical Technology

### Department of Medical Information Technology

#### Program of Medical Information Technology

#### Course Plan (Syllabus) of Computer Network

Course Code. 07.01.708

I. Information about Faculty Member Responsible for the Course:							
Name of Faculty Member:		Office Hours					
Location & Telephone No.:	777909815						
E-mail:	farouqakh@gmail.com	SAT	SUN	MON	TUE	WED	THU

2025/2024

## II. Course Identification and General Information:

1	Course Title:	Computer Network			
2	Course Code & Number:	07.01.708			
3	Credit Hours:	Credit Hours	Theory Hours		Lab. Hours
			Lecture	Exercise	
		3	2	--	2
4	Study Level/ Semester at which this Course is offered:	2nd Level / 2nd Semester			
5	Pre –Requisite (if any):	Introduction to Information Technology (07.01.701)			
6	Co –Requisite (if any):	None			
7	Program (s) in which the Course is Offered:	Bachelor of Medical Information Technology			
8	Language of Teaching the Course:	Mixed (English & Arabic)			
9	Study System:				
10	Mode of Delivery:	Full Time			
11	Location of Teaching the Course:	Faculty of Medical Technology			
12	Prepared by:	Assoc. Prof. Farouk Al-Fahaidy			
13	Date of Approval:				

### III. Course Description:

This course aims to provide students with basic principles and concepts related to data communications and networking design, simulation & implementation. Computer networks have raised demands in variant environmental applications, like social, medical, IoT, industries and marketing environments. Topics of the course include fundamentals of data communications and networking, networks models, multiplexing and transmission media, switching, network layers protocols and networks design, transport layer protocols and network management. This course is supported with practical lab experiments & computer-based lap works which develop student's practical & problem-solving skills related to network design, simulation, implementation and installation to different environmental contexts including medical environment.

### IV. Course Intended Learning Outcomes (CILOs) :

Upon successful completion of the Course, student will be able to:

A. Knowledge and Understanding:	
a1	Define terminologies related to computer networks such as network main H/W & S/W components, characteristics, topology types, models, standards, protocols, addressing, casting types, problems, management, ... etc.
a2	Demonstrate the computer network applications and fundamentals such as, protocol layering and operation, switching types and operation, error detection and correction mechanisms, addressing, casting operation, areas of network management, ... etc.
B. Intellectual Skills:	
b1	Compare between the computer networks protocol types, topology types, switching methods, mechanisms of error detection and correction, logical addressing protocols, casting types and management tools, in terms of merits and drawbacks.
b2	Select the appropriate computer network topology, type, protocols, switching method and associated switch, mechanism of error detection and correction, and management tool considering desired issues and applications.

### C. Professional and Practical Skills:

c1	Apply the theoretical concepts and practical skills in building of a computer network to different contexts, using the essential computer and communications H/W and S/W components.
c2	Use standard laboratory instruments and computer-based simulation for configuration and analyzing of the computer network operation and features.

### D. Transferable Skills:

d1	Work effectively as a member or a leader of a team by sharing ideas and practices skills throughout lab-work and the preparation of course-projects & reports related to the construction and configuration of network's solutions for different contexts including Health Information Technology discipline.
d2	Consider professional ethics, responsibilities, and organizational & social norms of professional networks practices.

## V. Course Contents:

### A. Theoretical Aspect:

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours
1	Course Orientation and Introduction	<ul style="list-style-type: none"> <li>– Course Orientation and General Information,</li> <li>– Course Intended learning outcomes (ILOs),</li> <li>– Data Communications,</li> <li>– Networks,</li> <li>– Network Types &amp; Topologies,</li> <li>– Internet History,</li> <li>– Standards, Protocols and Administration.</li> </ul>	1	2
2	Network Models	<ul style="list-style-type: none"> <li>– The ISO/OSI model,</li> <li>– Protocol Layering,</li> </ul>	1	2

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours
		– TCP/IP Protocol Suite.		
3	<b>Multiplexing &amp; Transmission Media</b>	<ul style="list-style-type: none"> <li>– Basic Concepts &amp; terminologies,</li> <li>– Introduction to Multiplexing,</li> <li>– Analog Multiplexing,</li> <li>– Digital Multiplexing,</li> <li>– Transmission Medias: Guided &amp; Un-Guided Transmissions media,</li> <li>– Wired, Wireless &amp; Optical transmission Media.</li> </ul>	2	4
4	<b>Switched WAN Networks</b>	<ul style="list-style-type: none"> <li>– Introduction to internetworking elements and device, Hubs, Bridges, Switches &amp; Routers,</li> <li>– Circuit-Switched Networks,</li> <li>– Packet-Switched Networks,</li> <li>– Virtual Circuit Switched Networks,</li> <li>– Structure of Switches &amp; Routers.</li> </ul>	2	4
5	<b>Data-Link Layer</b>	<ul style="list-style-type: none"> <li>– Introduction to Data-Link Layer, IEEE802.3 Frame Header &amp; Addressing,</li> <li>– Media Multiple Access Methods.</li> </ul>	1	2
6	Mid-term Theoretical Exam	All Previous Topics	1	2
7	<b>Error Detection and Correction</b>	<ul style="list-style-type: none"> <li>– Introduction to Coding,</li> <li>– Line &amp; Block Coding,</li> <li>– Cyclic Codes,</li> <li>– Checksum,</li> <li>– Forward Error Correction,</li> <li>– ARQ Protocol.</li> </ul>	1	2
8	<b>Network Layer Protocols</b>	<ul style="list-style-type: none"> <li>– Introduction and comparisons between Internet Protocols, IPv4 &amp; IPv6,</li> <li>– IPv4 Class-full &amp; Classless Addressing, and Address Depletion Problem,</li> <li>– Sub-networking and Network Design,</li> <li>– Network Design and IP's Distributions illustration for some organization,</li> <li>– ICMPv4,</li> <li>– ARP &amp; RARP,</li> <li>– Static &amp; Dynamic Assignment of IP:</li> </ul>	3	6

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours
		DHCP work, – MOBILE IP, – IPv4 vs. IPv6 Headers.		
9	Multicast Routing	– Multicasting Basic, – Intradomain Multicast Protocols, – Interdomain Multicast Protocols, – IGMPv4, – OSPF Protocol.	1	2
10	Transport Layer Protocols and Network Management & Security	– Introduction, – User datagram protocol (UDP), – Transmission control Protocol (TCP), and STCP – Introduction, SNMP, ASN.1, – Introduction to Confidentiality, Other aspects of security.	2	4
11	Final Theoretical Exam	– ALL Topics	1	2
12	Final Theoretical Exam			
Number of Weeks /and Units Per Semester			16	32

#### B. Case Studies and Practical Aspect:

No.	Tasks/ Experiments	Week Due	Contact Hours
1	Lab Orientations: Presentation of lab topics, Simulation tool (Packet Tracer+ GNS3+Wireshark+VMware+PowerSNMP), and lab terminal nodes (PCs, laptops, ... etc.).	1	2
2	Network passive and active devices: while passive devices include Guided (wired) like twisted-par, coaxial cable and fiber-optic cable. Unguided (wireless) like radio wave, microwave and infrared, active devices include switches, bridges, repeater, hubs, routers, wireless access points, firewalls, ... etc.  Network's cables & RG45 Connectors and its installation on coaxial cable	2	4

No.	Tasks/ Experiments	Week Due	Contact Hours
3	Addressing: MAC addressing, IP addressing (with different classes), private IP addressing, etc...	1	2
4	Subnetting and VLSM: Basics, Subnetting Class C Addresses, Subnetting Class B Addresses, Subnetting Class A Addresses, Variable Length Subnet Masks (VLSMs).	1	2
5	Configuration: Router Interfaces, implementing a Topology Using Packet Tracer, Some of Router Modes, Configurations Commands, Verification Commands.	1	2
6	Switching: Configuring VLANs, Routing between VLANs, Verification Commands, Issue to Solve.	1	2
7	Static Routing: Introduction, Pros and Cons, WAN Components, The Scenario, Configurations Commands, Verification Commands.	1	2
8	Dynamic Routing: Introduction, Pros and Cons, The Configurations (RIP, EIGRP, OSPF), Verification commands.	1	2
9	Servers and Protocols: HTTP, DNS, DHCP, Email, TFTP, Servers Testing, Router as DHCP Server, Telnet, Useful Command.	1	2
10	Network Management: SNMP Protocol.	1	2
11	Network implementation: implement variant synthesized LAN networks using necessary H/W and S/W.	2	4
12	Project Submission & Presentations	1	2
13	Final Practical Exam.	1	2
Number of Weeks /and Units Per Semester		15	30

### C. Tutorial Aspect:

No.	Tutorial	Number of Weeks	Contact Hours
1	NONE		
2			
3			
4			

No.	Tutorial	Number of Weeks	Contact Hours
5			
6			
7			
8			
9			
10			
Number of Weeks /and Units Per Semester			

## VI. Teaching Strategies of the Course:

- Active Lectures,
- Interactive class discussions,
- Exercises and Home Works.
- Laboratory based session,
- Problem-solving,
- Group work,
- Presentation
- Directed Self-study,
- Seminar/ project/presentation,
- Project

## VII. Assessment Methods of the Course:

- Project presentation,
- Laboratory exam,
- Assignment work,
- Report/Project
- Written exams,
- Quizzes,
- Practical exam,

- Report Submission
- Case studies.

### VIII. Assignments:

No.	Assignments	Week Due	Mark
1	<b>Assignment 1:</b> Network Types & Topologies and Networking Models, and Transmissions Media. <b>Report 1:</b> Multiplexing in Telephone & Mobile Networks.	3rd – 6th	4
2	<b>Assignment 2:</b> Switching & Error Detection & Corrections. <b>Report 2:</b> WAN Switching like MPLS Protocol.	7th – 10 <sup>th</sup>	4
3	<b>Assignment 3:</b> subnetting, Inter/intra- routing & configuration with Lab Reports	11th	4
4	<b>Report 3:</b> Network Advanced Technologies.	13th	3
<b>Total</b>			<b>15</b>

### IX. Schedule of Assessment Tasks for Students During the Semester:

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment
1	Assignments & Reports	3 <sup>rd</sup> – 13 <sup>th</sup>	15	10%
2	Quizzes 1 & 2	6 <sup>th</sup> & 11 <sup>th</sup>	10	6.67%
3	Mid-Term Theoretical Exam	8 <sup>th</sup>	20	13.33%
4	Final Practical Exam including Project Presentation & Evaluation	14 <sup>th</sup> & 15 <sup>th</sup>	30	20%
5	Final Theoretical Exam	16 <sup>th</sup>	75	50%
<b>Total</b>			<b>150</b>	<b>100%</b>

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment
1	Assignments & Reports	3 <sup>rd</sup> – 13 <sup>th</sup>	15	10%
2	Quizzes 1 & 2	6 <sup>th</sup> & 11 <sup>th</sup>	10	6.67%
3	Mid-Term Theoretical Exam	8 <sup>th</sup>	20	13.33%
4	Final Practical Exam including Project Presentation & Evaluation	14 <sup>th</sup> & 15 <sup>th</sup>	30	20%
5	Final Theoretical Exam	16 <sup>th</sup>	75	50%
Total			150	100%

## X. Learning Resources:

- *Written in the following order: Author, Year of publication, Title, Edition, Place of publication, Publisher.*

### 1- Required Textbook(s) (maximum two):

Behrouz A. Forouzan, 2018, "Data and computer Communications", 8th Edition, USA.

### 2- Essential References:

- 1- William Stallings, 2007 "Data Communications and networking", 10th Edition, Pearson Prentice Hall.
- 2- .....

### 3- Electronic Materials and Web Sites etc.:

#### Websites:

- 1- Text Book & Chapter's Notes: [www.mhhe.com/forouzan](http://www.mhhe.com/forouzan)
- 2- .....
- 3- ....
- 4- Journals:
- 5- .....
- 6- .....
- 7- Other Web Sources:
- 8- 1. MIT Courses: [www.courses.mit.com](http://www.courses.mit.com)

2.....

## XI. Course Policies: (Based on the Uniform Students' Bylaw (2007))

1	<b>Class Attendance:</b> Class Attendance is mandatory. A student is considered absent and shall be banned from taking the final exam if his/her absence exceeds 25% of total classes.
2	<b>Tardiness:</b> A student will be considered late if he/she is not in class after 10 minutes of the start time of class.
3	<b>Exam Attendance/Punctuality:</b> No student shall be allowed to the exam hall after 30 minutes of the start time, and shall not leave the hall before half of the exam time has passed.
4	<b>Assignments &amp; Projects:</b> Assignments and projects must be submitted on time. Students who delay their assignments or projects shall lose the mark allocated for the same.
5	<b>Cheating:</b> Cheating is an act of fraud that results in the cancelation of the student's exam or assignment. If it takes place in a final exam, the penalties stipulated for in the Uniform Students' Bylaw (2007) shall apply.
6	<b>Forgery and Impersonation:</b> Forgery/Impersonation is an act of fraud that results in the cancelation of the student's exam, assignment or project. If it takes place in a final exam, the penalties stipulated for in the Uniform Students' Bylaw (2007) shall apply.
7	<b>Other policies:</b> The University official regulations in force will be strictly observed and students shall comply with all rules and regulations of the examination set by the Department, Faculty and University Administration.