



Future Academy
Higher Future Institute for Specialized Technological Studies

Course Specification

1- Course information:

Course Code:	CSC 332
Course Title:	Advanced Computer Networks
Year/level	3 rd
Academic Programs	Computer Science Program (B.Sc.)
Contact hours/ week	(Theoretical = 2, Practical = 2, Total = 4)

2- Course aims:

The Advanced Computer Networks is designed to develop key technical and practical skills required by the current computer networks and network security industry. The design and development of the modules is inspired by our conversations with our industrial partners and prepares our students with key technical and soft skills required for fast career progression. While our general approach is focused on practice-based teaching and learning, the curriculum is also research-informed to provide an opportunity for further research and a smooth transition to PhD studentship. With introduction and adaption of relevant novel technologies such as Software Defined Networking, DevOps, Machine Learning, IoT and 5G, we foresee a significant demand for skills in these areas and the course aims to bridge this gap by delivering the latest and most relevant content through an innovative learning and teaching approach.

3- Intended learning outcomes of the course (ILOs):

a- Knowledge and understanding:

On successful completion of this course, the student should be able to:

- a1- **Explain** the principles behind using layering and cross-layering models and the interfaces between same layer protocols, two neighboring layers' protocols, and peer layers protocols.
- a2- **Identify** hot challenges in wired and wireless networking related areas such as routing, allocation of resources, quality of service, multicasting, network security, network planning and provide efficient solutions.
- a3- **Debate** the standards, protocols, RFCs on which the latest wired and wireless networking technologies and their applications are based and name relevant standardization bodies that are involved in developing and upgrading them.
- a4- **Compare** the existing solutions and proposed enhancements to featured problems related to existing networking technologies (WiFi, LTE, WSN, IOT, MANET, VANET), critique them, and identify and formulate a problem.

a5- **Evaluate** the performance of several approaches proposed to solve the same problem by using analytical models and/or simulation tools.

a6- **Write** scientific research paper that summarizes your research topic and findings.

a7- **Communicate** a complete piece of research in a 20-minute presentation.

b- Intellectual skills:

On completing this course, the student should be able to:

b1- **Subscribe** the network requirements of components, transmissions medium and communication protocols to meet desired need while these are idle ability.

b2- **Use** TCP/IP protocols for multicasting.

b3- **Construct** the bandwidth adjustment for small networks.

b4- **Formulate** the VLAN topologies for networks firewalls.

c- Professional and practical skills:

At the end of this course, the student will be able to:

c1- **Implement** different scenarios of computer network using simulation tools (packet tracer).

c2- **Employ** the various concept of data communication, techniques tools and equipment to build or simulate a small network with acceptable levels of simplification.

d- General and transferable skills:

On successful completion of this course, the student should be able to:

d1- **Work** effectively as a member of a group or individually to accomplish a common goal.

4- Course contents

Week No.	Topics/units	Number of hours		ILO's
		Lecture hours	Practical hours	
1	Overview of computer networking	2	2	a1
2	Mobile & wireless networks	2	2	a1
3	Mobile IP networks	2	2	a2, c1
4	Network Security + Quiz 1	2	2	a3, a4, b1, b2, c1
5	Multicasting Techniques and Protocols	2	2	a3, a4, b1, b2, c2, d1
6	Quality of Service and Resource Allocation	2	2	a5, b1, b2, d1
7	Midterm Exam			
8	Protocols for Internet Telephony and multimedia applications	2	2	a5, b1 , b2, d1

9	Content delivery networks, peer-to-peer protocols, data centers	2	2	a5, b1 ,b2, d1
10	Review and project discussion	2	2	a6, b1 , b2, b3, d1
11	Wireless Sensor Networks and Internet of Things + Quiz 2	2	2	a7, b4 , c2
12	Authentication and Digital Signature	2	2	a7, b4 , c2
13	Security Methods	2	2	A7, c1
14	Final Revision	2	2	

5- Teaching and learning methods

Methods															
	a1	a2	a3	a4	a5	a6	a7	b1	b2	b3	b4	c1	c2	d1	
Lectures	√	√	√	√	√	√	√	√		√	√	√	√		
Practical sections									√	√	√	√	√	√	
Self-learning															
Problem solving							√	√	√	√	√	√	√		
Assays and reviews															
Discussion groups								√							

6- Teaching and learning methods for Low-achieving students

- Additional teaching office hours for those who need help.
- More assignments to assess their ability for understanding the course.
- Encourage the teamwork for those students with other advanced ones to increase their participation and understanding.

7- Student assessment

Assessment method	Time	Grade weight (%)	Week	ILOs
Course Work (Tutorial Exercise and Assignments)	Through the semester	10	Every Week	a3, a4, a5, a6, a7, b2, b3, b4, c1, c2, d1

Quiz 1	Through the lecture	5	Week#4	a1, a2,c1
Mid-term exam	1 hours	10	Week#7	a3, a5, c1, c2
Quiz 2	Through the lecture	5	Week#11	a3, a4 a5, a6, b3
Practical exam	2 hours	10	Week#14	b2, c1, c2, a7
Final Written exam	2 hours	60	Week# 15-16	a1, a2, a3, a4, a5, a6, a7, c1, c2

8-List of references

8.1. Student notebooks:

Comprehensive instructor notes ("PowerPoint slides") are available on the course web page ("Google Classroom")

8.2. Essential textbooks:

- Computer Networking: A Top-Down Approach, 8th Edition, James F. Kurose, ISBN: 555-9885600912, 2012
- Data Communications and Networking with TCP/IP Protocol Suite, 6th Edition, Behrouz A. Forouzan, ISBN: 900-12390998463, 2010

8.3. Recommended textbooks:

- Network Programmability & Automation, Matt Oswalt, Fourth Edition, ISBN: 808-0774631928, 2008

8.4. Journals, Periodical and Reportsetc.

8.5. Websites

- <https://www.javatpoint.com/computer-network-tutorial>
- <https://www.w3schools.com/whatis/default.asp>

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