



Course Code ECE-324	Course Title Data Communication and Computer Networks	ECTS Credits 6
Department Engineering	Semester Spring	Prerequisites ECE-110, MATH-191
Type of Course Required/Elective	Field Engineering	Language of Instruction English
Level of Course 1 st Cycle	Year of Study 3 rd	Lecturer(s) Dr Antonis Hadjiantonis
Mode of Delivery Face-to-face	Work Placement N/A	Co-requisite None

Objectives of the Course:

The main objectives of the course are to:

- introduce the basic characteristics of computer networks and how their effective design and standardization takes place
- establish an understanding of the ISO OSI layer model and compare it to the TCP/IP suite
- examine and distinguish the various forms of multiplexing (like time-, space-, wavelength- and frequency- and code-division multiplexing)
- establish the concept of a switched network and the various technologies it may adopt. Specifically compare and contrast the circuit-and packet-switching technologies
- explore routing schemes
- provide the basic design principles of wired and wireless communication networks.
- introduce the student to the computer simulation of network functionalities like routing and messaging
- briefly introduce the major high-speed network architectures, technologies and standards of today's telecom
- discuss current and future networking trends

Learning Outcomes:

After completion of the course students are expected to:

1. identify the basic computer network characteristics
2. associate with the need for network layered approach and correspond various protocols to the OSI model
3. underline the concept of switched networks and evaluate the technologies of packet- and circuit-switching
4. compare and contrast the various forms of division multiplexing
5. determine how digital and analog and digital telephone hierarchies came to be
6. appraise the basic spread spectrum techniques (DSSS and FHSS)

7. distinguish the protocols used in various types of computer networks (TCP, UDP, ALOHA, Token Ring etc.)
8. determine what ad-hoc and sensor networks are, and identify the various constraints specific to these networks
9. access network performance using a computer simulation

Course Contents:

1. Introduction to Networks (OSI layers, topologies, standardization bodies)
2. Introduction to transmission systems. Multiplexing /demultiplexing concepts (TDM, FDM etc.). The E1/DS1 frames
3. Spread Spectrum techniques
4. Digital telephone exchange and the PSTN. Broadband access technologies. Copper based access (xDSL), Fiber in the access network (PON, FTTx)
5. Data-Link Layer Encoding, Framing and Synchronization, Error Detection and Correction, Flow control and the sliding window algorithm
6. Principles of Medium Access Control. Ethernet (802.3), Token Ring (802.5), FDDI, Wireless (802.11)
7. Packet- and Circuit- switching technologies
8. The Network Layer and its usage in the Internet, routing and addressing principles
9. Transport layer Services and Protocols. UDP and TCP; TCP congestion control
10. Current networking trends: Sensor and Ad-Hoc Networks
11. Brief introduction to high-speed networks (ATM, SDH/SONET etc.)

Learning Activities and Teaching Methods:

Lectures, Theoretical In-class Exercises and brief computer tutorials

Assessment Methods:

Homework, Computer Simulation Projects and Labs, Mid-Term, Final Exam.

Required Textbooks/Reading:

Authors	Title	Publisher	Year	ISBN
Behrouz Forouzan	Communications and Networking	McGraw Hill	2007	007-125442-0

Recommended Textbooks/Reading:

Authors	Title	Publisher	Year	ISBN
William Stallings	Data and Computer Communication	Pearson Education	2009	0-13-507139-9