UNIVERSITY of NICOSIA

Course Syllabus

Course Code	Course Title	ECTS Credits
ECE-354	Data Communication Technologies	6
Prerequisites	**Department**	**Semester**
ECE-324	Engineering	Fall, Spring
Type of Course	**Field**	**Language of Instruction**
Elective	Engineering	English
Level of Course	**Lecturer(s)**	**Year of Study**
1st Cycle	Dr Antonis Hadjiantonis	3rd
Mode of Delivery	**Work Placement**	**Corequisites**
Face-to-face	N/A	None

Course Objectives:

The main objectives of the course are to:

- refresh the OSI layer model and reanalyze the basic concepts used in networks (like multiplexing, switching etc.)
- introduce the major high-speed network architectures, technologies and standards of today's telecom
- provide a through analysis of SONET/SDH operation and position it in terms of current and future telecom trends (why it came to be, where is it strong, where is it weak)
- introduce the ATM and investigate why it was strong and why is it now weak; perform basic ATM network designs and explore the concept of statistical multiplexing via simulation
- provide the MPLS fundamentals; provide comparison with ATM
- introduce the necessary building blocks (optical Mux, Dmux and OXC's) for λ-routed networks and investigate their performance via simulation.
- help develop a circuit-switched network simulation tool(using NS2 and/or MATLAB and/or C/C++) that measures performance in terms of blocking probability

Learning Outcomes:

After completion of the course students are expected to be able to:

1. translate the networking layers
2. identify the strengths and weaknesses of IP
3. determine the operation and principles of SONET/SDH

4. identify the strong points of ATM (QoS) and why it failed to deliver
5. demonstrate basic knowledge on what MPLS is and why it tends to replace ATM
6. criticize the "IP/MPLS-over-ATM-over-SONET/SDH-over-DWDM" network overlaying; why is it used? Why is it unwanted?
7. develop and use a tool for a network-wide simulation, through which to gain insight on network performance

Course Content:

1. Intro. (OSI layers, transmission systems, multiplexing concepts)
2. Packet and Circuit switching technologies
3. SDH/SONET multiplexing structure and overheads. Topologies and applications, protection mechanisms.
4. Asynchronous Transfer Mode (ATM): Standards, packet format, segmentation and reassembly). ATM switches, ATM adaptation layer, Virtual Paths (PVC, SVC), ATM connections, traffic shaping, Quality of service. IP and ATM convergence
5. MPLS switching, label POP/PUSH/SWAP, label stacking and tunneling. Intro to GMPLS
6. WDM network elements, network topologies, applications and relation to SDH and other (client) technologies. Protection in WDM networks.

Learning Activities and Teaching Methods:

Lectures

Assessment Methods:

Homework, Computer Simulation Projects, Mid-Term, Final Exam

Required Textbooks / Readings:

Title	Author(s)	Publisher	Year	ISBN
Data and Computer Communication	William Stallings	Pearson Education	2009	0-13-507139-9

Recommended Textbooks / Readings:

Title	Author(s)	Publisher	Year	ISBN
Communications and Networking	Behrouz Forouzan	McGraw Hill	2007	007-125442-0
Installation and Maintenance of SDH/SONET, ATM, xDSL and Synchronization Networks	Jose M. Caballero, Fransisco Hens, Roger Segura and Andreu Guimera	ARTECH HOUSE INC.	2003	1-58053-525-9