

COURSE OUTLINE

(1) GENERAL

SCHOOL	Engineering				
ACADEMIC UNIT	Department of Computer Engineering & Informatics				
LEVEL OF STUDIES	Undergraduate				
COURSE CODE	CEID_24Y387	SEMESTER	6 st		
COURSE TITLE	Computer Networks				
INDEPENDENT TEACHING ACTIVITIES <i>if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits</i>	WEEKLY TEACHING HOURS	CREDITS			
Lectures and tutorials	4	4			
Laboratory exercises	2	2			
<i>Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).</i>					
COURSE TYPE <i>general background, special background, specialised general knowledge, skills development</i>	Specialized general knowledge Skills development				
PREREQUISITE COURSES:	None				
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek				
IS THE COURSE OFFERED TO ERASMUS STUDENTS	No				
COURSE WEBSITE (URL)	https://www.ceid.upatras.gr/el/undergraduate/courses/diktya-ypologiston https://eclass.upatras.gr/courses/CEID1138/				

(2) LEARNING OUTCOMES

Learning outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.

Consult Appendix A

- Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area
- Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B
- Guidelines for writing Learning Outcomes

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

- (1) The operation and organization of a computer network as well as the architecture of the Internet
- (2) Understand basic applications (FTP, HTTP, DNS etc) and structure / operation of computer networks in accordance with OSI
- (3) Understand the operation of the transport control layer, analyze the operation of TCP, UDP, flow control and error handling
- (4) Understand network layer operations, different switching modes, analyze IP header fields, IP addressing issues, and IP router operation. It will also study routing algorithm and routing protocols for the Internet.
- (5) Understand data link layer functions, error correction and error detection mechanisms as well as addressing mechanisms at level 2, implementation of virtual local networks. It will also understand functions of basic protocol of layer 2 (Ethernet, 802.11).
- (6) Finally, it will understand basic principles of packet switching and circuit switching networks as well as the physical means used for network interconnection.

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology	Project planning and management
Adapting to new situations	Respect for difference and multiculturalism
Decision-making	Respect for the natural environment
Working independently	Showing social, professional and ethical responsibility and sensitivity to gender issues
Team work	Criticism and self-criticism
Working in an international environment	Production of free, creative and inductive thinking
Working in an interdisciplinary environment
Production of new research ideas	Others...

Working independently

Team work

Working in an international environment

Working in an interdisciplinary environment

Production of new research ideas

(3) SYLLABUS

A. Lectures and Tutorials

- Introduction to the Internet
 - End router and trunk router
 - Packet switching - circuit switching
 - Delay, loss and rate performance on packet switching networks
 - Overview of delays in packet switched networks
 - Delay and packet loss
 - Network performance
 - Protocols and computer network service models
- Principles of network applications
 - The Internet and the HTTP protocol
 - The file transfer protocol and e-mail protocols
 - DNS - Internet Directory Service
 - Programming sockets: Creating network applications
- Transport and Control Layer (TCP) services and protocols
 - Multiplexing and demultiplexing of logical connections
 - Connectionless Data Sharing: UDP protocol
 - Principles of Reliable Package Transport
 - Go-Back-N (GBN) and Selective Repeat (SR)
 - Connection-Oriented Packet Transfer: the TCP protocol
 - Reliable data transfer
 - Flow control
 - Principles of congestion control
 - TCP congestion control
- The IP network layer
 - Functions and architecture of IP routers
 - Input processing, packet switching and output processing into IP routers.
 - The IP control layer
 - The IP protocol: Forwarding and addressing functions on the internet
 - IP header format and fields
 - Addressing in IPv4
 - The ICMP control protocol
 - Introduction and basic of IPv6 header
 - Principles of routing algorithms
 - Link-State and Distance vector algorithms
 - Hierarchical routing and protocols (RIP, OSPF, BGP) routing on the Internet
 - Broadcast and Multicast in IP networks - spanning tree design.
- The Data link level
 - Logical data-level services and sub-levels architecture
 - Parity Checks, Checksumming, Cyclic Redundancy Check
 - Multiple access protocols and multiplexing techniques.
 - Local Data Switching Networks
 - Data-level addressing and ARP protocol
 - Data switches and local area network interconnection
 - The Ethernet protocol
 - Virtual Local Area Networks
 - MPLS protocol description
 - Data center architecture.
 - Wireless local area networks and their architecture
 - The protocol and architecture of 802.11
 - Transmission management and discovery of nodes

B. Lab projects

- 1) Set of projects for web programming. Implementing ICMP ping, SMTP client, traceroute, UDP, webserver. (total: 2 exercises)
- 2) Set of exercises with GNS3. Topology implementation and network performance study (total: 6 implementation)

(4) TEACHING and LEARNING METHODS - EVALUATION

<p>DELIVERY <i>Face-to-face, Distance learning, etc.</i></p> <p>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY <i>Use of ICT in teaching, laboratory education, communication with students</i></p> <p>TEACHING METHODS <i>The manner and methods of teaching are described in detail.</i> <i>Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.</i> <i>The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS</i></p>	<p>Face-to-face</p> <p>Wide use of ICT and more specifically :</p> <ul style="list-style-type: none"> • The course is backed up by a web page providing all course material. This page is duly updated. • Homeworks are announced electronically through this page, submitted also through this page and marking for them is also announced electronically • The preferred communication method with the students is email. <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Activity</th><th style="text-align: center;">Semester workload</th></tr> </thead> <tbody> <tr> <td style="text-align: center;">Lectures</td><td style="text-align: center;">39 hours</td></tr> <tr> <td style="text-align: center;">Tutorials</td><td style="text-align: center;">13 hours</td></tr> <tr> <td style="text-align: center;">Laboratory exercises</td><td style="text-align: center;">13 hours</td></tr> <tr> <td style="text-align: center;">Laboratory exercises preparation</td><td style="text-align: center;">42 hours</td></tr> <tr> <td style="text-align: center;">Lab report preparation</td><td style="text-align: center;">10 hours</td></tr> <tr> <td style="text-align: center;">Study – problem solving</td><td style="text-align: center;">40 hours</td></tr> <tr> <td style="text-align: center;">Theory exams</td><td style="text-align: center;">3 hours</td></tr> <tr> <td style="text-align: center;">Laboratory exams</td><td style="text-align: center;">1 hour</td></tr> <tr> <td style="text-align: center;">Course total</td><td style="text-align: center;">161 hours</td></tr> </tbody> </table>	Activity	Semester workload	Lectures	39 hours	Tutorials	13 hours	Laboratory exercises	13 hours	Laboratory exercises preparation	42 hours	Lab report preparation	10 hours	Study – problem solving	40 hours	Theory exams	3 hours	Laboratory exams	1 hour	Course total	161 hours
Activity	Semester workload																				
Lectures	39 hours																				
Tutorials	13 hours																				
Laboratory exercises	13 hours																				
Laboratory exercises preparation	42 hours																				
Lab report preparation	10 hours																				
Study – problem solving	40 hours																				
Theory exams	3 hours																				
Laboratory exams	1 hour																				
Course total	161 hours																				
<p>STUDENT PERFORMANCE EVALUATION <i>Description of the evaluation procedure</i></p> <p><i>Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other</i></p> <p><i>Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</i></p>	<p>The evaluation is performed in Greek language and is based on two independent parts.</p> <p>The theory evaluation is performed through a final written test that includes multiple choice questions, short-answer questions and problem solving. Sample solutions to the written test are announced so that a reference point for marking is provided. After the test marks are announced the students have the opportunity to see their mistakes.</p> <p>The evaluation for the laboratory part is based:</p> <ul style="list-style-type: none"> • on the reports that the students submit • on a final written exam with a multiple choice set of questions, that are based on the reports they submitted, and the lab projects implemented. 																				

(5) ATTACHED BIBLIOGRAPHY

<p>-Books :</p> <ul style="list-style-type: none"> ▪ Computer Networking: J.F. KUROSE, K.W. ROSS ▪ Computer Networks: ANDREW S. TANENBAUM, DAVID J. WETHERALL <p>-Συναφή επιστημονικά περιοδικά:</p> <ul style="list-style-type: none"> ▪ IEEE/ACM Transactions on Networking ▪ IEEE Selected Areas on Communications
