COURSE OUTLINE

(1) GENERAL

SCHOOL	Science and Technology
ACADEMIC UNIT	Science and Technology
PROGRAMME OF STUDIES	MSc in Cybersecurity, MSc in Information and Communication Technology Systems, MSc in Mobile and Web Computing
LEVEL OF STUDIES	Postgraduate

COURSE CODE	CC02, IC07, MC02	**SEMESTER**	1

COURSE TITLE	Computer Networks
COURSE TYPE *Elective, compulsory*	Compulsory
INSTRUCTOR(S)	Assistant Professor Anastasios C. Politis, Dimitris Baltatzis (Research and teaching staff)

INDEPENDENT TEACHING ACTIVITIES *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*	**WEEKLY TEACHING HOURS**	**CREDITS**
	4,2	6
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

TEACHING ACTIVITIES BREAKDOWN	**WEEKLY HOURS**
Theory	2,3
Recitation	0,7
Lab	1,2
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).	

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	General background
PREREQUISITE COURSES:	-

LANGUAGE OF INSTRUCTION and EXAMINATIONS:	English
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes
COURSE WEBSITE (URL)	https://elearn-ucips.ihu.gr/

(2)

(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*

On completing the course, the student will be able to:

- Understand the basic principles and concepts of computer networking.
- Explain the operation of different computer networks protocols.
- Perform basic configurations in networking devices (switches and routers).
- Perform basic troubleshooting in small and medium network topologies.

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...*
	....

- Search for, analysis and synthesis of data and information, with the use of the necessary technology
- Decision Making
- Working independently
- Production of free, creative, and inductive thinking

(3)

(3) SYLLABUS

This course will examine computer networks within the context of the Internet. We will follow the Internet layered structure, starting from the lower layers and working our way towards the top of the architecture. In each layer, we will study the fundamental principles, elements, and protocols that operate in each of them. We will investigate how the different protocols work, why they work that way, and their performance trade-offs. Using this knowledge, we will try to examine the way applications are deployed on the Internet. Emphasis will be given in hands-on activities using free and open source tools.

- Introduction to Computer Networks
- Protocol Stacks and Layering
- Physical Layer Basics,
- Link Layer Concepts
- Switching & Flow Control
- Ethernet and Bridging
- Network Layer Concepts
- ICMP, ping & traceroute commands
- IP forwarding & addressing
- IP Datagrams & Routers
- Routing: RIP & OSPF, Routing: BGP, Multicast, DNS, IPv6, tunnelling, NAT, VPN, Virtual circuits
- Transport Layer Concepts
- TCP & Congestion Control.
- TCP Performance
- Security – firewalls, ACLs, DoS
- Packet capturing and analysis: Wireshark
- Create, configure and troubleshoot internetworks using specific simulators:, Cisco Packet Tracer, GNS3

(4)

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Hybrid: Face to face and synchronous distance learning
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	**Use of ICT in Teaching** During the educational process, computer networking simulators and packet analyser tools will be used. The hybrid teaching method involves synchronous learning with the support of the videoconferencing tool Zoom. Students are taught a variety of tools related to the course content and material. **Use of ICT in Communication with students** • The course material (slides, scientific articles, exercises, etc.) is posted on the course page at the e-learn platform (Moodle). • Use of Moodle Forums announcements. • Live video meetings via Zoom. • Contact via email.

TEACHING METHODS	Activity Semester workload
The manner and methods of teaching are described in detail. *Lectures, recitation, 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.* *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*	Lectures 30 hrs. Recitation 9 hrs. Lab 15 hrs. Project 8 hrs. Exams 2 hrs. Non-Directed Study 86 hrs. **Course total 150 hrs.**

COURSE MATERIAL ARRANGEMENT	**Theory/Recitation**
	Introduction to computer networking Computer networks architectures and protocol stack Physical layer basic operation Concepts of data link layer Ethernet networks and switching Network layer IPv4 and IPv6 addressing Routing with RIP, OSPF, EIGRP and BGP NAT and ACLs Transport Layer UDP and TCP protocols Network security: firewalls and DMZs **Lab** Introduction to Wireshark Packet Analysis Create small internetworks Networking devices configuration with Cisco Packet Tracer Troubleshooting with Cisco Packet Tracer

STUDENT PERFORMANCE EVALUATION	

Description of the evaluation procedure
 	
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
 	
Specifically-defined evaluation criteria are given, and if and where they are accessible to students
	Language of Evaluation: English
	
	Evaluation Procedure:
	    ● Written Exams (70%). Methods of evaluation:
	        ○ Open-ended questions
	        ○ Problem solving
	        ○ Multiple choice questions
	    ● Group project (30%):
	        ○ The students should achieve a passing grade to participate in the written exams.
	The evaluation procedure is announced to the students during the first lecture and is also accessible at the e-learn platform throughout the entire semester.

STUDENT OBLIGATIONS	
Compulsory attendance of lectures, labs, recitations, compulsory participation in midterms, exams, compulsory delivery of homework, projects, etc.	● Compulsory attendance of lectures ● Compulsory attendance of recitation ● Compulsory attendance of labs ● Compulsory participation in the exams ● Compulsory delivery of project

(5)

(5) ATTACHED BIBLIOGRAPHY

- Suggested Textbooks
1. J. Kurose, K. Ross: Computer networking: a top-down approach, 8th edition, Addison Wesley (2020).
2. W. Stallings: Data and computer communications, 8th edition, Prentice Hall (2007).
3. A. Tanenbaum, D. Wetherall: Computer networks, 5th edition, Pearson (2013)

- Additional Bibliography:

1. W. Odom. CCNA 200-301 Official Cert Guide, Volume 1. Cisco Press, 2020.
2. W. Odom. CCNA 200-301 Official Cert Guide, Volume 2. Cisco Press, 2020.

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