

NETWORK SECURITY

1. GENERAL

SCHOOL	ENGINEERING		
DEPARTMENT	DEPARTMENT OF INFORMATICS AND COMPUTER ENGINEERING		
LEVEL OF EDUCATION	GRADUATE		
COURSE CODE	CSCYB206	SEMESTER OF STUDIES	B'
COURSE TITLE	Network Security		
INDEPENDENT TEACHING ACTIVITIES <i>in case the credits are awarded in separate parts of the course e.g. Lectures, Laboratory Exercises, etc. If the credits are awarded uniformly for the whole course, indicate the weekly teaching hours and the total number of credits.</i>		WEEKLY HOURS OF TEACHING	ECTS CREDITS
	Lectures	3	
	Practice -Exercises	2	
<i>Add rows if needed. The teaching organization and teaching methods used are described in detail in 4.</i>		5	7
COURSE TYPE <i>Background, General Knowledge, Scientific Area, Skills Development</i>	<i>Skills Development</i>		
PREREQUISITE COURSES:	-NONE		
LANGUAGE OF TEACHING AND EXAMS :	ENGLISH		
ERASMUS STUDENTS	Yes (English)		
ONLINE COURSE (URL)	Cscyb.uniwa.gr and eclass (UNIWA Open eClass Επιλογή μαθημάτων)		

2. LEARNING OUTCOMES

Learning outcomes

The learning outcomes of the course are described, the specific knowledge, skills and abilities of an appropriate level that students will acquire after the successful completion of the course.

Refer to Appendix A.

- Description of the Level of Learning Outcomes for each course according to the Qualifications Framework of the European Higher Education Area
- Descriptive Indicators Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B
- Summary Guide for writing Learning Outcomes

Network Security is a key topic in a Cybersecurity Master of Science program that enhances students' knowledge on security in many different types of computer networks.

The aim of the course is to deepen the theoretical and practical skills that students already have in computer networks and in the field of computer security, and cover the required complementary topics in a cybersecurity framework. This will provide them with additional expertise and high-level skills for the job market and research dimensions to continue their studies at the next level.

By the end of this course a student will reach the professional level in network security in terms of

up-to-date terminologies, main concepts, new technologies, and popular tools.

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

- to recognize the factors that lead to the need for network and communications security.
- identify and categorize specific examples of network attacks.
- identify vulnerabilities in communications and networks.
- to design and implement secure network systems and applications.
- to distinguish the advantages and disadvantages of alternative secure network and communications architectures.
- to distinguish and compare symmetric and asymmetric cryptosystems and to know the characteristics of hybrid systems.
- to know the tools and techniques to identify the security gaps of network devices and applications and to distinguish problems and errors due to insufficient implementation of security mechanisms of devices and insufficient protection of information transmitted through online applications.
- to apply his knowledge to protect devices and networked information from malicious interception, modification, destruction and falsification of information.
- to evaluate the secure operation of networks, to identify any security gaps when accessing and transmitting information, especially to remote users.
- to face developments in the field of network and communications security, topics in which he will have deepened his knowledge.
- will have the ability to guide the changes brought about by technological developments in this field.
- will have the ability to evaluate and distinguish between secure and non-secure network systems and communications between their parts.
- will have the ability to systematically apply the acquired knowledge to understand and solve practical problems.
- will have the ability to use modern methods to protect network and communication systems.

will have the ability to work with others to solve real-world problems.

General Abilities

Taking into account the general skills that the graduate must have acquired (as they are listed in the Diploma Supplement and are listed below), which of them is intended for the course ?

<i>Search, analysis and synthesis of data and information, using the necessary technologies</i> <i>Adaptation to new situations</i> <i>Decision making</i> <i>Autonomous work</i> <i>Teamwork</i> <i>Working in an international environment</i> <i>Work in an interdisciplinary environment</i> <i>Production of new research ideas</i>	<i>Project design and management</i> <i>Respect for diversity and multiculturalism</i> <i>Respect for the natural environment</i> <i>Demonstration of social, professional and moral responsibility and sensitivity in gender issues</i> <i>Exercise criticism and self-criticism</i> <i>Promoting free, creative and inductive thinking</i>
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Working in an interdisciplinary environment
 Generating new research ideas
 Searching, analysing and synthesising data
 Adapting to new situations
 Decision-making

3. COURSE CONTENT

This course is organized as follows:

Lecture 1: Introduction to Network Security

Lecture 2: Encryption

Lecture 3: Intrusion Detection Systems

Lecture 4: Vehicular Ad-hoc Networks

Lecture 5: WEKA
 Lecture 6: TCP Attacks
 Lecture 7: Privacy
 Lecture 8: Firewall Avoidance using VPN
 Lecture 9: SNORT
 Lecture 10: Advanced Intrusion Detection Topics
 Lecture 11: Security and Privacy on the Blockchain
 Lecture 12: Trusted Supply Chains
 Lecture 13: Presentation of final papers and public discussion on them

4. TEACHING AND LEARNING METHODS - EVALUATION

<p>METHOD OF DELIVERY <i>Face to face, Distance education etc.</i></p>	<p>In class face to face</p>												
<p>USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES <i>Use of ICT in Teaching, in Laboratory Education, in Communication with students</i></p>	<p>Use of ICT in Teaching, Laboratory Education and Communication with Students</p>												
<p>TEACHING ORGANIZATION <i>The way and methods of teaching are described in detail.</i> <i>Lectures, Seminars, Laboratory Exercise, Field Exercise, Bibliography study & analysis, Tutoring, Internship (Placement), Clinical Exercise, Art Workshop, Interactive teaching, Study visits, Study work, artwork, creation. λπ.</i></p> <p><i>The student study hours for each learning activity are indicated as well as the non-guided study hours so that the total workload at the semester level corresponds to the ECTS standards.</i></p>	<p>Projection system and presentation capability with the application of the Power Point program, - Internet connection, - Use of bibliography search engines HEAL-LINK, PUBMED, SCOPUS, GOOGLE SCHOLAR - Use of e-mail and the Department's website to communicate with students and keep them informed - Use of the course eclass -</p> <p>Semester Workload Activity</p> <table border="1" data-bbox="667 1223 1331 1592"> <thead> <tr> <th><i>Method description</i></th> <th><i>Semester Workload</i></th> </tr> </thead> <tbody> <tr> <td>Lectures</td> <td>39</td> </tr> <tr> <td>Practice exercises that focus on the application of methodologies and analysis of studies</td> <td>26</td> </tr> <tr> <td>Research work</td> <td>50</td> </tr> <tr> <td>Self study</td> <td>60</td> </tr> <tr> <td>Total course hours (25 h workload per ECTS)</td> <td>175</td> </tr> </tbody> </table>	<i>Method description</i>	<i>Semester Workload</i>	Lectures	39	Practice exercises that focus on the application of methodologies and analysis of studies	26	Research work	50	Self study	60	Total course hours (25 h workload per ECTS)	175
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<p>STUDENT EVALUATION <i>Description of the evaluation process</i></p> <p><i>Assessment Language, Assessment Methods, Formative or Concluding, Multiple Choice Test, Short Answer Questions, Essay Development Questions, Problem Solving, Written Assignment, Report / Report, Oral Examination, Public Presentation, Public Presentation, Others</i></p> <p><i>Explicitly defined assessment criteria are stated and if and where they are accessible to students.</i></p>	<p>Presentation and examination of Final Project (100%).</p>												

5. RECOMMENDED-BIBLIOGRAPHY

- Προτεινόμενη Βιβλιογραφία :

1. W.Stallings, Κρυπτογραφία για Ασφάλεια Δικτύων Αρχές και Εφαρμογές, Εκδότης Παρίκου ΕΠΕ, 2011 (Κωδ. Εύδοξος: 12777632)
2. J.F. Kurose, K.W. Ross, “Δικτύωση Υπολογιστών, Προσέγγιση από πάνω προς τα κάτω, 6η Έκδοση 2013”, Εκδόσεις: Γκιούρδα & ΣΙΑ, (Κωδ. Εύδοξος: 33094885)
3. B. Forouzan, Cryptography and Network Security, McGraw Hill, Εκδόσεις Επίκεντρο Α.Ε, 2008 (Κωδ. Εύδοξος: 12562157)
4. J.F. Kizza, “Guide to Computer Network Security”, Springer, 2017
5. L. Ertaul, L.H. Encinas and E. El-Sheikh “Computer and Network Security Essentials”, Springer, 2017
6. X. He and H. Dai, “Dynamic Games for Network Security”, Springer, 2018
7. E. Maiwald, “Network Security”, Mc Graw Hill, 2013