



HELLENIC REPUBLIC
National and Kapodistrian
University of Athens
—EST. 1837—



DEPARTMENT OF
INFORMATICS &
TELECOMMUNICATIONS

UNDERGRADUATE STUDY PROGRAM (USP)

COURSES OUTLINE



MARCH 2019



UNDERGRADUATE STUDY PROGRAM (USP)

I. THE EDUCATIONAL OBJECTIVES OF THE UNDERGRADUATE STUDY PROGRAM (USP)

The Department of Informatics and Telecommunications (DIT) of the National and Kapodistrian University of Athens (NKUA) offers a contemporary Undergraduate Study Program (USP) based on programs proposed by the top international scientific organizations, the Association for Computing Machinery (ACM) and the IEEE Computer Society (CS) for computing, enriched with modern subjects on Telecommunications. In addition, it offers courses for competence of teaching and education.

The USP coverage of the main areas in Information Technology and Telecommunications in conjunction with the high scientific quality of the Department (in the world top 100 for the years 2010-2013) provides graduates of the Department the possibility to create personalized profiles according to their scientific interests, abilities and skills. In addition to the scientific culture, the USP cultivates an engineering perspective through specialized tasks and laboratories. The USP also includes a dissertation and/or internships outside the University.

The competences of the Department's graduates satisfy the requirements of the full range of professional employment in industry, businesses and organizations, primary/secondary education teaching, as well as, basic and applied research.

The USP aims at cross-cutting knowledge of all main areas in Informatics and Telecommunications, but also aims at specialization, offering compulsory, core and electives subjects of six specializations, organized in two tracks, to which the Department has a very high level of research excellence.

II. STRUCTURE OF THE UNDERGRADUATE STUDY PROGRAM (USP)

The USP offered by the Department of Informatics and Telecommunications of NKUA leads to qualification in «Informatics and Telecommunications» with the accumulation of 240 credits (ECTS), implemented in 8 semesters and consists of two two-year cycles:

- **The Basic Cycle**, which consists of an introductory course, 16 Compulsory courses (YM), and 3 optional laboratory courses (EP), which provide basic knowledge in Informatics and Telecommunications.
- **The Focused Cycle**, offers 2 more Compulsory courses (YM); the rest of the courses are organized in 2 *Tracks* leading to 6 *Specializations*, in which the Department has a very high level of research activity. Students may pursue up to two specializations, which are listed in their final transcript of study. There is also the possibility of no specialization at all, as well as, the possibility to obtain a certificate of pedagogical and didactic competence in conformance with the terms and conditions set by NKUA.

Track A (conforming to ACM “Computer Science” curriculum) leads to three specializations

- E1. Foundations of Computer Science**
- E2. Data and Knowledge Management**
- E3. Software**

Track B (conforming to IEEE-CS “Computer Engineering” curriculum) leads to three specializations:

- E4. Hardware and Architecture**
- E5. Communications and Networking**
- E6. Signal and Information Processing**

In detail, the courses of the Focused Cycle of study are divided into:

1. **Track Compulsory courses** (EYM), Students submit the statement of their track of choice at the beginning of the 5th semester, before their statements of courses, and is compulsory for students wanting to register courses from the Focused Cycle of study. Students must choose one of the 2 tracks, even if they do not want to pursue any specialization. Students select 4 track compulsory courses and 1 track project. If they want to follow a specialization, 2 out of the 4 compulsory courses should be specialization compulsory as well.
2. **Core Specialization courses** (ΠΜ-B), compulsory for each specialization. Students choose at least 4 out of 8 courses of the specialization they want to pursue.
3. **Elective Specialization courses** (ΠΜ-E), electives for each specialization. May be replaced by any track compulsory courses or by core subjects of another specialization (e.g. an extra project).
4. **Free Electives** (ΕΛ). Students can accumulate up to 8 ECTS from free courses from a specific list of free courses in the NKUA or from specialization core/electives courses (EYM, ΠΜ) (e.g. an extra project).

In addition, students take 3 courses on General Education and are required to produce a dissertation or follow external internship or a combination of both, which covers two semesters and is equivalent to two compulsory courses of 8 ECTS each.

III. PROGRAM REQUIREMENTS:

In order to obtain a degree in Informatics and Telecommunications, a student must enroll, attend and successfully complete courses accumulating at least 240 ECTS as follows:

- 18 compulsory courses (124 ECTS)
- 4 track compulsory courses (24 ECTS)
- 1 track project (8 ECTS)
- 4 core specialization courses (24 ECTS)
- 3 general education (6 ECTS)

- A Thesis/Internship or a combination of both, which is annual and is equivalent to two compulsory courses (16 ECTS)
- Subjects from the following
 - 4 to 6 core or elective specialization courses (24 ECTS) (specialization requirements)
 - 3 optional laboratory (6 ECTS) or any other course
 - 2 free electives courses (8 ECTS) or any other course

The degree of the new USP is calculated on a credit unit basis (ECTS). All courses are counted in the degree according to the following formula:

$$Degree = \frac{\sum_{i=1}^v \Pi M_i \bullet B_i}{\sum_{i=1}^v \Pi M_i}$$

where:

v is the total number of courses counted for a degree, ΠM_i is the ECTS attributed to the corresponding course, and B_i is the grade the student received in the corresponding course.

IV. SUMMARY TABLE OF OFFERED COURSES

In the following tables the head of columns indicate: T (teaching hours in classroom), C (consulting/seminars in classroom), L (Hands-on Laboratory), PR/TES (Prerequisites –recommended and compulsory), S (Semester), T (Track), and E1-E6 indicate the role of each course in a specialization, i.e. Y (specialization compulsory) B (specialization core), E (specialization Elective).

A. COMPULSORY COURSES (YM)

AA	CODE	COURSE TITLE	T	C	L	ECTS	PR/TES	S	T	E1	E2	E3	E4	E5	E6
1	K03	LINEAR ALGEBRA	3	2		6		1°							
2	K09	DISCRETE MATHEMATICS	4	2		7		1°							
3	K04	INTRODUCTION TO PROGRAMMING	3	1	2	7		1°							
4	K02	LOGIC DESIGN	3	1		6		1°							
5	K01	CALCULUS I	4	2		8		2°							
6	K12	ELECTROMAGNETISM, OPTICS, CONTEMPORARY PHYSICS	6	2		8		2°							
7	K08	DATA STRUCTURES AND PROGRAMMING TECHNIQUES	3	1	1	7	K04	2°							
8	K14	COMPUTER ARCHITECTURE I	3	1	1	7	K02	2°							
9	K06	CALCULUS II	4	2		8	K01	3°							
10	K13	PROBABILITY AND STATISTICS	3	1		6		3°							
11	K10	OBJECT-ORIENTED PROGRAMMING	3	1	2	8	K04	3°							
12	K11	SIGNALS AND SYSTEMS	3	1		6	K01	3°							
13	K17	ALGORITHMS AND COMPLEXITY	4	2		8	K08 K09	4°							
14	K29	DESIGN AND APPLICATIONS OF DATABASE SYSTEMS	3	1	1	7	K08	4°							
15	K21	COMMUNICATION SYSTEMS	3	1	1	7	K11	4°							
16	K16	COMMUNICATION NETWORKS I	3	1		6	K13	4°							
17	K22	OPERATING SYSTEMS	4		1	8	K14 K08	5°							
18	K24	SYSTEMS PROGRAMMING	4		1	8	K14 K08	6°							

In light gray the recommended prerequisites of the main course (the main course has no prerequisites).
With black the prerequisite courses of the focused study cycle.

B. OPTIONAL LABORATORY (EP)

AA	CODE	COURSE TITLE	T	C	L	ECTS	PR/TES	S	T	E1	E2	E3	E4	E5	E6
1	K02ε	LOGIC DESIGN LABORATORY			2	2		1°							
2	K11ε	CIRCUITS AND SYSTEMS LABORATORY			2	2	-	3°							
3	K16ε	COMMUNICATIONS NETWORK LABORATORY I			2	2	-	4°/ 5°							

In the first two years, students may attend 3 optional laboratories, oriented to computer engineering curriculum, which are distinct from their respective courses in order to provide a better quality of education on the one hand, and to attract the most interested students on the other. Students who do not wish to take these courses will have to take other elective courses (EYM, ΠΜΒ or E) to complete the ECTS that they will be missing for a degree.

C. TRACK COMPULSORY COURSES (EYM)

AA	CODE	COURSE TITLE	T	C	L	ECTS	PR/TES	S	T	E1	E2	E3	E4	E5	E6
1	K15	NUMERICAL ANALYSIS	3	1	1	6	K01 K03	5°	A	Y					E
2	K18	IMPLEMENTATION OF DATABASE SYSTEMS	3	1		6	K29	5°	A		Y	Y			
3	K30	COMPUTER ARCHITECTURE II	3	1	1	6	K14	5°	B			B	Y		
4	K33	COMMUNICATION NETWORKS II	3	1	1	6	K16	5°	B					Y	
5	K32	SIGNAL PROCESSING	4		1	6	K11	5°	B						Y
6	K20α	MATHEMATICS FOR COMPUTER SCIENCE	4	1		6	K09	6°	A	Y					
7	K25	THEORY OF COMPUTATION	3	1		6	K17	6°	A		Y				
8	K31	COMPILERS	3	1		6	K08 K10 K14	6°	A			Y	B		

9	K19	ELECTRONICS	3	1		6	K11ε	6°	B				Y	E	
10	K34	NETWORK MANAGEMENT	3	1		6	K16	6°	B					Y	
11	K35	INFORMATION AND CODE THEORY	3	1		6	K13	6°	B						Y

Students choose 4 of the offered 5 or 6 Track courses of A or B, respectively, with the limitation that "Numerical Analysis", "Implementation of Database Systems" and "Theory of Computation" are compulsory for all students who choose Track A. "Y" in the table denotes that a course is compulsory for the specialization.

D. Project

AA	CODE	COURSE TITLE	T	C	L	ECTS	PR/TES	S	T	E1	E2	E3	E4	E5	E6
1	K23γ	SOFTWARE DEVELOPMENT FOR ALGORITHMIC PROBLEMS	1		3	8	K17 K25	7°	A						
2	K23α	SOFTWARE DEVELOPMENT FOR INFORMATION SYSTEMS	1		3	8	K18 K29	7°	A						
3	K23β	SOFTWARE DEVELOPMENT FOR NETWORK AND TELECOMMUNICATION SYSTEMS	1	4	1	8	K16 K33	7°	B						
4	K23δ	HARDWARE-SOFTWARE DEVELOPMENT FOR EMBEDDED SYSTEMS	3		3	8	K14 ΥΣ03	8°	B						

Students select 1 out of the 2 proposed projects of their Track (A or B) of choice.

E. GENERAL COURSES (ΓΠ)

AA	CODE	COURSE TITLE	T	C	L	ECTS	PR/TES	S	T	E1	E2	E3	E4	E5	E6
1	ΓΠ7	INTRODUCTION TO INFORMATION AND TELECOMMUNICATIONS	2			2		1°							
2	ΓΠ3	STRUCTURE AND INSTITUTIONS OF THE EUROPEAN UNION	2			2		7°							

3	ΓΠ5	PROJECT MANAGEMENT – TECHNIQUES FOR WRITING AND PRESENTING SCIENTIFIC REPORTS	2			2		8°							
---	-----	--	---	--	--	---	--	----	--	--	--	--	--	--	--

F. DISSERTATION (ΠΕ) - INTERNSHIP (ΠΑ)

Students are required to complete a dissertation which is annual and corresponds to two compulsory courses of 8 credits (ECTS) each. The dissertation (one or two semesters) may be replaced by an Internship externally developed in an organization and has a corresponding duration and workload.

G. FREE CLASSES (ΕΛ)

Students may accumulate up to 8 ECTS in free courses from a specific list of free courses or electives (eg an extra project). This list of free courses is decided at the Departmental Assembly and posted on the Department's website.

H. ELECTIVE COURSES (ΠΜ)

AA	CODE	COURSE TITLE	T	C	L	ECTS	PR/TES	S	T	E1	E2	E3	E4	E5	E6
1	ΘΠ01	PRINCIPLES OF PROGRAMMING LANGUAGES	3	1		6	K08	5°	A	B	B	E			
2	ΘΠ02	COMPUTER GRAPHICS I	3		1	6	K03	5°	A B	B			E		B
3	ΥΣ02	ARTIFICIAL INTELLIGENCE	3	1		6	K08	5°	A	E	B	B			
4	ΥΣ03	DESIGN OF DIGITAL SYSTEMS - VHDL	3		1	6	K02 K14	5°	A B			E	B		
5	ΘΠ04	PARALLEL SYSTEMS	3	1		6	K14	5°	A B		E	B	B		
6	ΕΠ05	WAVES, WAVEGUIDES, ANTENNAS	3		1	6	K12	5°	B					B	
7	ΕΠ20	TELECOMMUNICATION NETWORKS	3		1	6	K16	5°	B					B	
8	K20β	APPLIED MATHEMATICS	3	1		6	K06	5°	B					E	B
9	ΘΠ12	ADVANCED TOPICS ON ALGORITHMS	3	1		6	K17	6°	A	B					
10	ΘΠ03	SCIENTIFIC COMPUTING (NUMERICAL LINEAR ALGEBRA)	3	1		6	K03	6°	A	B					E
11	ΘΠ08	NUMBER THEORY	3	1		6	K09	6°	A	E					
12	ΥΣ11	DATA MINING TECHNIQUES	3	1		6	K29	6°	A B		B	E			E
13	ΥΣ05	LOGIC PROGRAMMING	3	1		6	K08	6°	A		B	E			
14	ΥΣ04	ANALYSIS / DESIGN OF SOFTWARE SYSTEMS	3		1	6	K10	6°	A			B			
15	ΥΣ14	TECHNOLOGIES OF INTERNET APPLICATIONS	2	1	1	6	K10	6°	A B			B		B	
16	K19ε	LABORATORY OF ELECTRONICS		1	3	6	K11ε	6°	B				B	E	
17	ΥΣ18	WIRELESS SENSOR NETWORKS	3	1		6	K16	6°	B				B	B	
18	ΕΠ07	STATISTICAL SIGNAL PROCESSING	3	1		6	K11	6°	B					B	B

19	ΕΠ08	PATTERN RECOGNITION - MACHINE LEARNING	3	1		6	K13	8° 6°	A B		B					B
----	------	---	---	---	--	---	-----	----------	--------	--	---	--	--	--	--	---

AA	CODE	COURSE TITLE	T	C	L	ECTS	PR/TES	S	T	E1	E2	E3	E4	E5	E6
20	ΘΠ09	ALGORITHMIC OPERATIONS RESEARCH	3	1		6	K17	7°	A B	B	B	E			B
21	ΘΠ05	CRYPTOGRAPHY	3	1		6	K17	7°	A B	B			E		E
22	ΘΠ07	COMPUTER GRAPHICS II	3			4	ΘΠ02	7°	A B	E					E
23	ΘΠ10	GRAPH THEORY	3	1		6	K20α	7°	A B	E				E	
24	ΘΠ17	ALGORITHMS OF BIOINFORMATICS	3	1		6	K17	7°	A B	E	E				E
25	ΘΠ18	ADVANCED SCIENTIFIC COMPUTING	3	1		6	K15	7°	A	E					
26	ΥΣ08	HUMAN-COMPUTER INTERACTION	3	1		6	K08	7°	A		B	B		E	E
27	ΥΣ07	INFORMATION SYSTEMS	2	1		4	K29	7°	A			B*			
28	ΥΣ10	DIDACTICS OF INFORMATICS	2		2	6		7°	A B	E	E	E	E	E	E
29	ΥΣ15	INFORMATION AND COMMUNICATIONS TECHNOLOGIES IN LEARNING	2		2	6		7°	A B	E	E	E	E	E	E
30	ΥΣ17	E-GOVERNMENT	3			4	K10	7°	A			E			
31	ΕΠ11	REAL-TIME DIGITAL SIGNAL PROCESSING SYSTEMS	2		2	6	K11	7°	B				B		B
32	ΕΠ16	OPTICAL COMMUNICATIONS AND NETWORKS	3		1	6	K12	7°	B				B	B	
33	ΕΠ04	DIGITAL COMMUNICATIONS	3		1	6	K21	7°	B				E	B	
34	ΕΠ13	WIRELESS LINKS IN WIRELESS COMMUNICATIONS	3		1	6	K12	8°	B					E	

35	ΕΠ18	MOBILE AND PERSONAL COMMUNICATION SYSTEMS	3	1		6	K21	7°	B						B	
----	------	---	---	---	--	---	-----	----	---	--	--	--	--	--	---	--

AA	CODE	COURSE TITLE	T	C	L	ECTS	PR/TES	S	T	E1	E2	E3	E4	E5	E6
36	ΘΠ20	COMPUTATIONAL COMPLEXITY	3	1		6	K25	8°	A	B					
37	ΘΠ11	COMPUTATIONAL GEOMETRY	3	1		6	K08	8°	A	B	E				
38	ΘΠ19	PARALLEL ALGORITHMS	3	1		6	K17	8°	A	E					
39	ΘΠ14	LINEAR AND NONLINEAR OPTIMIZATION	3			4	ΘΠ03	8°	A B	E					E
40	ΥΣ19	ARTIFICIAL INTELLIGENCE II	3	1		6	ΥΣ02	8°	A		B				
41	ΕΠ19	SPEECH AND NATURAL LANGUAGE PROCESSING	3		1	6	K11	8°	A B		E				B
42	ΥΣ13	COMPUTER SYSTEMS PROTECTION AND SECURITY	3	1		6	K22	8°	A B			B		E	
43	ΥΣ09	SOFTWARE ENGINEERING	3	1		6	K10	8°	A			B			
44	ΕΠ01	DESIGNING VLSI CIRCUITS	3		1	6	K19	8°	B				B		
45	ΕΠ12	PHOTONIC	3		1	6	K19	8°	B				E	E	
46	ΕΠ10	IMAGE PROCESSING	3		1	6	K32	8°	B				E		B
47	ΕΠ21	MUSIC INFORMATICS	2	1		4	K32	8°	B						B
48	ΕΠ23	IMAGE ANALYSIS AND ARTIFICIAL VISION	3		1	6	K32	8°	B						B
49	ΥΣ20	HISTORY OF COMPUTER SCIENCE AND TELECOMMUNICATIONS	3			4		8°	A B	E	E	E	E	E	E
50	ΥΣ12	INNOVATION AND ENTREPRENEURSHIP	2	1		4		8°	A B	E	E	E	E	E	E
51	ΕΠ24	MICROECONOMIC ANALYSIS	3			4		8°	A B	E	E	E	E	E	E

52	ΘΠ16	SPECIAL TOPICS ON THEORETICAL COMPUTER SCIENCE	3/4			4		7° 8°	A	E					
53	ΥΣ16	SPECIAL TOPICS ON COMPUTING SYSTEMS AND COMPUTER SCIENCE APPLICATIONS	3/4			4		7° 8°	A B		E	E	E		
54	ΕΠ22	SPECIAL TOPICS ON COMMUNICATIONS AND SIGNAL PROCESSING	3/4			4		7° 8°	B				E	E	E
55	ΥΣ21	SCHOOL CLASSROOM AND MICROTACHING	2		2	6		8°	A B	E	E	E	E	E	E
56	ΥΣ22														

V. SPECIALIZATION REQUIREMENTS

To qualify for a specialization the student should be successfully examined:

- ✓ In the 2 specialization compulsory courses (subset of the track compulsory courses)
- ✓ In 4 specialization core courses.

If a student does not wish to have a specialization, it is required that he/she has been successfully examined:

- ✓ In 4 track-compulsory courses of the selected Track.
- ✓ In 4 specialization core courses in any of the 3 specializations of the chosen Track.

Students can enroll up to 2 specializations with the limitation that the specialization core courses used in the qualification of one specialization cannot be reused to qualify the other specialization.

VI. CERTIFICATE FOR EDUCATIONAL AND TEACHING ATTAINMENT

The certificate is granted when the student has successfully completed:

- ✓ the 3 courses: ΥΣ10 Didactics of Informatics, ΥΣ15 ICT in Learning and ΥΣ21 School classroom and Microteaching.
- ✓ 2 specialization compulsory courses for Educational and Teaching Attainment from the followings offered: ΥΣ08 Human Computer Interaction, ΥΣ22 Information Systems and e-accessibility for students with disabilities and one of the free courses that focuses on pedagogical psychology (e.g. Educational Psychology offered by the Department of Philosophy, Pedagogy and Psychology of the School of Philosophy of NKUA).

VII. COURSES OUTLINE

A. COMPULSORY COURSES (YM).....	17
Discrete Mathematics	17
Introduction to Programming	20
Data Structures	23
Computer Architecture I	26
Analysis II.....	29
Probability and Statistics.....	32
Object-Oriented Programming	35
Signals and Systems	38
Algorithms and Complexity.....	41
Design and Use of Database Systems	44
Communications Systems	47
Communication Networks I	50
Operating Systems	53
Systems Programming	56
B. OPTIONAL LABORATORY (EP)	59
Logic Design Lab	59
Circuits and Systems Laboratory.....	62
Communications Network I Lab.....	67
C. TRACK COMPULSORY COURSES (EYM)	70
Numerical Analysis.....	70
Computer Architecture II	73
Communication Networks II	76
Mathematics for Computer Science	79
Theory of Computation.....	82
Compilers	85
Electronics.....	88

Network Management.....	91
D. PROJECT	94
Software Development for Algorithmic Problems.....	94
Software Development for Information Systems	97
Software Development for Network and Telecommunication Systems	100
Hardware / Software Codesing for Embedded Systems.....	103
E. GENERAL COURSES (ΓΠ)	106
Introduction to Computer Science and Telecommunications	106
Structure and Institutions of the European Union	109
Project Management and Techniques for Presenting and Writing Scientific Reports	112
H. ELECTIVE COURSES (ΠΜ).....	115
Principles of Programming Languages.....	115
Computer Graphics I	118
Artificial Intelligence	121
Parallel Systems	124
Advanced Topics on Algorithms.....	127
Scientific Computing	131
Logic Programming	134
Internet Application Technologies.....	137
Electronics Laboratory	140
Stochastic Signals	143
Algorithmic Operations Research	146
Graph Theory	149
Advanced Scientific Computing	152
Human-Computer Interaction	155
Information Systems	158
Didactics of Informatics	161
Information and Communications Technology (ICT) in Learning	164
e-Government.....	167
Real-Time Digital Signal Processing Systems	170
Optical Communications and Optical Networks.....	174

Digital Communications	177
Wireless Links.....	180
Mobile and Wireless Communication Systems.....	183
Computational Complexity	186
Computational Geometry	189
Parallel Algorithms.....	192
Speech and Natural Language Processing	195
Software Engineering.....	198
Innovation and Entrepreneurship.....	201
School Classroom and Microteaching.....	204

A.COMPULSORY COURSES (YM)

INSTITUTION	NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS					
SCHOOL	SCHOOL OF SCIENCE					
DEPARTMENT	INFORMATICS AND TELECOMMUNICATIONS					
COURSE LEVEL	UNDERGRADUATE					
COURSE TITLE	Discrete Mathematics					
COURSE CODE	K09	Semester	1	ECTS	7	
TEACHING HOURS per week	THEORY	4	SEMINAR.	2	LABORATORY	
COURSE TYPE	Select one of the following and delete the rest Compulsory (YM)					
URL	https://eclass.uoa.gr/courses/D268/					
EXPECTED PRIOR KNOWLEDGE/ PREREQUISITES AND PREPARATION:	--					
TEACHING AND EXAMINATIONS LANGUAGE:	GREEK					
THE COURSE IS OFFERED TO ERASMUS STUDENTS	NO					

COURSE CONTENT
Introduction to the following concepts: Sets, Mathematical logic and induction, <i>binary relations, functions, combinations and permutations, discrete probability distributions, conditional probability, independent events, Bayes theorem, asymptotic behavior of arithmetic functions. Seminar exercises are given as well as a final test.</i>

STUDENT LEARNING OBJECTIVES
Teaching-Learning Goals-Expected Learning Outcomes Upon successful completion of the course the student will be able to: • Describe and explain problems in set theory and function theory. • Choose appropriate techniques for solving discrete math questions using combinatorics, discrete probability, induction, pigeonhole principle, inclusion-exclusion principle. • Construct methods for solving problems in enumeration of discrete objects.

- Evaluate algorithm performance based on their asymptotic complexity.

TEACHING AND LEARNING METHODS - ASSESSMENT			
TEACHING METHOD	In Class (Face to Face)		
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	Learning process supported by the e-class platform, specifically Lecture material, Discussions, Announcements, Exercises solved, and Student groups. Email communication Live transmission of lectures with presentation. Ability to track recorded lectures Utilization of educational environments (https://eclass.uoa.gr/courses/D268/)		
TEACHING ORGANIZATION	<i>Describe in detail the way and methods of teaching:</i> Enhanced Lectures, Online Lectures, Seminars, Tutorial, Laboratory, Laboratory Exercise, Study & analysis of literature, Practice (Positioning), Interactive teaching, Developing a project, Individual / group work Telework (reference to tools) etc. <i>Details of the student's study hours for each learning activity and hours of non-guided study are shown to ensure that the total workload at the semester corresponds to the ECTS</i>		
ASSESSMENT OF STUDENTS	<i>Description of the assessment process</i> Assessment Methods, Formative or Concluding, Multiple Choice Test, Quick Response Questions, Test Development Questions, Problem Solving, Written Work, Report / Report, Oral Examination, Public Presentation, Laboratory Work, Other / Other <i>Fully defined evaluation criteria are mentioned and if and where they are accessible to students.</i>		
	Students evaluation tools by final written exam. Seminar tests weighted by 10%. Solutions discussed in class with student participation (oral). Re-grading possible after meeting and discussion with student.		
	Assessment methods	Number	Percentage
	Written examination	1	90%
	Seminar exercises	4	10%

LITERATURE AND STUDY MATERIALS / READING LIST

- K.H. Rosen. *Discrete Mathematics and its Applications (6th Edition)*. McGraw-Hill, 2007.
- C.L. Liu. Elements of Discrete Mathematics. Crete University Press, 2003.
- L. Kirousis, C. Bouras, P. Spiraki. Discrete Mathematics with Applications. Gutenberg, 2004.
- H. Cormen, E. Leiserson, R.L. Rivest, C. Stein. Introduction to Algorithms. Crete University Press.

INSTITUTION	NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS					
SCHOOL	SCHOOL OF SCIENCE					
DEPARTMENT	INFORMATICS AND TELECOMMUNICATIONS					
COURSE LEVEL	UNDERGRADUATE					
COURSE TITLE	Introduction to Programming					
COURSE CODE	K04	Semester	1	ECTS	7	
TEACHING HOURS per week	THEORY	3	SEMINAR.	1	LABORATORY	2
COURSE TYPE	Select one of the following and delete the rest Compulsory (YM)					
URL	https://eclass.uoa.gr/courses/D8/					
EXPECTED PRIOR KNOWLEDGE/ PREREQUISITES AND PREPARATION:	None					
TEACHING AND EXAMINATIONS LANGUAGE:	GREEK					
THE COURSE IS OFFERED TO ERASMUS STUDENTS	NO					

COURSE CONTENT
Introduction and history of computers and programming. Computer organization and information representation. Programming languages and software. Procedural programming language principles. Compilation, linking and executing programs. The C programming language. Development environments for C. The compiler gcc. Small C program examples. Types, declarations, variables and constants. Statements, expressions, operators and the assignment. Control flow. The structure of a C program, functions and global variables. The lifetime of a variable, the scope of a declaration. Recursion. Memory addresses, pointers and arrays. Dynamic memory allocation. Strings. Arrays of pointers, pointers to pointers, multidimensional arrays. Pointers to functions. Command line parameters. Enumerations, structures, recursive structures (lists, binary trees), unions, bit fields, user-defined types. Input/Output. File input/output. The Preprocessor and macro definitions. Sorting and searching in arrays. Programming guidelines. Usual bugs when programming in C.

STUDENT LEARNING OBJECTIVES
Teaching-Learning Goals-Expected Learning Outcomes The course aims to familiarize the student with programming using C language and support her/him to obtain the knowledge background to cope with all the undergraduate programming courses of the curriculum of our Department.

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

- Design an algorithm to solve a specific problem
- Explain the functionality of a specific algorithm
- Program using the appropriate procedural programming concepts
- Program in C using the appropriate language constructs
- Explain the functionality of a functionality of a specific C program

TEACHING AND LEARNING METHODS - ASSESSMENT											
TEACHING METHOD	In Class (Face to Face)										
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	Learning process supported by web site page where all course material is uploaded as well as the course of the lectures Mailing list, Announcements, Task assignments, Email communication Live transmission of lectures Ability to track recorded lectures Laboratory work										
TEACHING ORGANIZATION <i>Describe in detail the way and methods of teaching:</i> Enhanced Lectures, Online Lectures, Seminars, Tutorial, Laboratory, Laboratory Exercise, Study & analysis of literature, Practice (Positioning), Interactive teaching, Developing a project, Individual / group work Telework (reference to tools) etc. <i>Details of the student's study hours for each learning activity and hours of non-guided study are shown to ensure that the total workload at the semester corresponds to the ECTS</i>	During the lectures, slides are used as well as program code which is explained and executed to illustrate the theory. For the lab classes, first year students are divided into eight groups. There is also an optional lab class for the rest of students. Any time during the semester, students can express any questions or views about the theory, the lab work or the assignments into the course's discussion forum. <table border="1"> <thead> <tr> <th>Activity</th><th>Student Workload (hours)</th></tr> </thead> <tbody> <tr> <td>Lectures + Tutorials</td><td>52</td></tr> <tr> <td>Laboratory</td><td>26</td></tr> <tr> <td>Assignments / Independent Study</td><td>97</td></tr> <tr> <td>Total Course</td><td>175</td></tr> </tbody> </table>	Activity	Student Workload (hours)	Lectures + Tutorials	52	Laboratory	26	Assignments / Independent Study	97	Total Course	175
Activity	Student Workload (hours)										
Lectures + Tutorials	52										
Laboratory	26										
Assignments / Independent Study	97										
Total Course	175										

ASSESSMENT OF STUDENTS

Description of the assessment process

Assessment Methods, Formative or Concluding, Multiple Choice Test, Quick Response Questions, Test Development Questions, Problem Solving, Written Work, Report / Report, Oral Examination, Public Presentation, Laboratory Work, Other / Other

Fully defined evaluation criteria are mentioned and if and where they are accessible to students.

The requirements of the course consist of a written exam plus a sequence of practical work assignments. For the first year students, performance in the labs is also taken into account.

Assessment methods	Number	Percentage
Written examination	1	50% (1 st year students) / 70% (other)
Assignments	4	30%
Laboratory	13	20% (1 st year students)

LITERATURE AND STUDY MATERIALS / READING LIST

- P. Stamatopoulos, "Introduction to Programming: Lecture Notes" + "Lab Notes", 2017.
- Brian W. Kernighan, Dennis M. Ritchie. "The C Programming language", Prentice-Hall (Greek Edition), 1988
- Γ. Σ. Τσελίκης, Ν. Δ. Τσελίκας. "C: Από τη Θεωρία στην Εφαρμογή", 3η έκδοση, 2016.
- Νικόλαος Μισυρλής. "Εισαγωγή στον Προγραμματισμό με την C", 3η έκδοση, 2007.
- Νίκος Χατζηγιαννάκης. "Η Γλώσσα C σε Βάθος", 5η έκδοση, εκδόσεις Κλειδάριθμος, 2017.
- Δημήτριος Καρολίδης. "Μαθαίνετε Εύκολα C", 2013.

INSTITUTION	NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS																			
SCHOOL	SCHOOL OF SCIENCE																			
DEPARTMENT	INFORMATICS AND TELECOMMUNICATIONS																			
COURSE LEVEL	UNDERGRADUATE																			
COURSE TITLE	Data Structures																			
COURSE CODE	K08	Semester	2	ECTS	7															
TEACHING HOURS per week	THEORY	4	SEMINAR.	1	LABORATORY	1														
COURSE TYPE	Select one of the following and delete the rest Compulsory (YM) <table border="1"> <thead> <tr> <th>K</th><th>E1</th><th>E2</th><th>E3</th><th>E4</th><th>E5</th><th>E6</th></tr> </thead> <tbody> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </tbody> </table> <i>Fill the table as in the curriculum: Track (A-Computer Science, B- Computer Engineering) / Specialization Compulsory (Y) / Core Specialization (B)/ Elective Specialization (E)</i>						K	E1	E2	E3	E4	E5	E6							
K	E1	E2	E3	E4	E5	E6														
URL	http://cgi.di.uoa.gr/~k08																			
EXPECTED PRIOR KNOWLEDGE/ PREREQUISITES AND PREPARATION:	K04																			
TEACHING AND EXAMINATIONS LANGUAGE:	GREEK																			
THE COURSE IS OFFERED TO ERASMUS STUDENTS	YES																			

COURSE CONTENT
Basic programming knowledge using the C language (pointers, structures, linked data representations). Recursion. Modularity and data abstraction. Stacks. Queues. Algorithm analysis. Lists and strings. Trees and expression trees. Heaps. Binary search trees. AVL trees. M-way trees. 2-3 trees. 2-3-4 trees. B-trees. Red black trees. Hashing. Disjoint sets. Graphs and graph algorithms. Sorting.

STUDENT LEARNING OBJECTIVES

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

- develop modular programs that use abstract data types
- develop recursive programs
- solve problems by using the appropriate data structures
- compute the complexity of used algorithms
- analyze the performance of various data structures to solve given problems

TEACHING AND LEARNING METHODS – ASSESSMENT

TEACHING METHOD

In Class (Face to Face)

USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES

Email communication
Live transmission of lectures
Ability to track recorded lectures
Utilization of educational platform <https://piazza.com> for answering student questions and making announcements etc.

TEACHING ORGANIZATION

Describe in detail the way and methods of teaching:

*Enhanced Lectures,
Online Lectures,
Seminars,
Tutorial,
Laboratory,
Laboratory Exercise,
Study & analysis of literature,
Practice (Positioning),
Interactive teaching,
Developing a project,
Individual / group work
Telework (reference to tools) etc.*

Details of the student's study hours for each learning activity and hours of non-guided study are shown to ensure that the total workload at the semester corresponds to the ECTS

Activity	Student Workload (hours)
Lectures	52
Laboratory	13
Tutorial	13
Preparation for next lecture	13
Individual exercises	54
Preparation for final exams	30
Total Course (25 hours of workload per unit of credit)	175

ASSESSMENT OF STUDENTS

Description of the assessment process

Assessment Methods, Formative or Concluding, Multiple Choice Test, Quick Response Questions, Test Development Questions, Problem Solving, Written Work, Report / Report, Oral Examination, Public Presentation, Laboratory Work, Other / Other

Fully defined evaluation criteria are mentioned and if and where they are accessible to students.

Describe explicitly methods, evaluation tools and provided feedback.

The table below is supplemented accordingly.

Assessment methods	Number	Percentage
Written examination	1	50%
Exercises	3	40%
Laboratory Work	1	10%

LITERATURE AND STUDY MATERIALS / READING LIST

- Thomas A. Standish: Data Structures, Algorithms and Software Principles in C, Addison-Wesley. 1995.
- Robert Sedgewick: Algorithms in C
- Michael T. Goodrich, Roberto Tamassia: Data Structures and Algorithms in JAVA
- Slides from lectures
- Relevant material from the Web page of the course

INSTITUTION	NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS																			
SCHOOL	SCHOOL OF SCIENCE																			
DEPARTMENT	INFORMATICS AND TELECOMMUNICATIONS																			
COURSE LEVEL	UNDERGRADUATE																			
COURSE TITLE	Computer Architecture I																			
COURSE CODE	K14	Semester	2	ECTS	7															
TEACHING HOURS per week	THEORY	3	SEMINAR.	1	LABORATORY	1														
COURSE TYPE	Select one of the following and delete the rest Compulsory (YM) <table border="1"> <thead> <tr> <th>K</th><th>E1</th><th>E2</th><th>E3</th><th>E4</th><th>E5</th><th>E6</th></tr> </thead> <tbody> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </tbody> </table> <i>Fill the table as in the curriculum: Track (A-Computer Science, B- Computer Engineering) / Specialization Compulsory (Y) / Core Specialization (B)/ Elective Specialization (E)</i>						K	E1	E2	E3	E4	E5	E6							
K	E1	E2	E3	E4	E5	E6														
URL	https://eclass.uoa.gr/courses/D19/																			
EXPECTED PRIOR KNOWLEDGE/ PREREQUISITES AND PREPARATION:	K02 Logic Design																			
TEACHING AND EXAMINATIONS LANGUAGE:	GREEK																			
THE COURSE IS OFFERED TO ERASMUS STUDENTS	NO																			

COURSE CONTENT
Computer organization and design. Hardware/software interface. Instruction set architecture. RISC vs. CISC. Assembly language for MIPS microprocessor. Assemblers, compilers, loaders basics. Performance evaluation and benchmarking. Power/energy/yield/cost calculations and models. Computer arithmetic for integers and reals. CPU simple design. Pipeline and caches basics. Architectural simulators.

STUDENT LEARNING OBJECTIVES

Teaching-Learning Goals-Expected Learning Outcomes

Introduction to computer organization and design of modern computer architectures and the details of the hardware and software interface.

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

- Describe the organization of a computing system
- Evaluate performance, power, energy and cost
- Write programs in assembly language
- Use architectural simulators
- Design a simple central processing unit
- Explain the basics of pipelining and caches

TEACHING AND LEARNING METHODS - ASSESSMENT

TEACHING METHOD

In Class with slides and whiteboard for examples and exercises of the course.

In the PCs Lab using educational architectural simulators.

USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES

Electronic platform e-class (all tools employed: announcements, documents, assignments, groups of users, etc.)

Email communication

Live broadcasting of lectures

Recording of lectures for offline study

TEACHING ORGANIZATION

Describe in detail the way and methods of teaching:

*Enhanced Lectures,
Online Lectures,
Seminars,
Tutorial,
Laboratory,
Laboratory Exercise,
Study & analysis of literature,
Practice (Positioning),
Interactive teaching,
Developing a project,
Individual / group work
Telework (reference to tools) etc.*

Details of the student's study hours for each learning activity and hours of non-guided study are shown to ensure that the total workload at the semester corresponds to the ECTS

Activity	Student Workload (hours)
Lectures	39
Tutorial	13
Laboratory	13
Lab preparation	39
Small individual exercises	15
Independent Study	69
Total Course (25 hours of workload per unit of credit)	175

ASSESSMENT OF STUDENTS

Description of the assessment process

Assessment Methods, Formative or Concluding, Multiple Choice Test, Quick Response Questions, Test Development Questions, Problem Solving, Written Work, Report / Report, Oral Examination, Public Presentation, Laboratory Work, Other / Other

Fully defined evaluation criteria are mentioned and if and where they are accessible to students.

Describe explicitly methods, evaluation tools and provided feedback.

The table below is supplemented accordingly.

Assessment methods	Number	Percentage
Written examination	1	70%
Laboratory	1	30%

LITERATURE AND STUDY MATERIALS / READING LIST

"Computer Organization and Design: the Hardware/Software Interface", 4th Edition, D.A.Patterson, J.L.Hennessy, Elsevier/Morgan Kaufmann, 2010.

INSTITUTION	NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS																			
SCHOOL	SCHOOL OF SCIENCE																			
DEPARTMENT	INFORMATICS AND TELECOMMUNICATIONS																			
COURSE LEVEL	UNDERGRADUATE																			
COURSE TITLE	Analysis II																			
COURSE CODE	K06	Semester	3	ECTS	8															
TEACHING HOURS per week	THEORY	4	SEMINAR.	2	LABORATORY															
COURSE TYPE	Select one of the following and delete the rest Compulsory <table border="1"> <tr> <td>K</td><td>E1</td><td>E2</td><td>E3</td><td>E4</td><td>E5</td><td>E6</td></tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </table>						K	E1	E2	E3	E4	E5	E6							
K	E1	E2	E3	E4	E5	E6														
URL	https://eclass.uoa.gr/courses/D260/																			
EXPECTED PRIOR KNOWLEDGE/ PREREQUISITES AND PREPARATION:																				
TEACHING AND EXAMINATIONS LANGUAGE:	GREEK																			
THE COURSE IS OFFERED TO ERASMUS STUDENTS	Yes, in the English language for Erasmus students																			

COURSE CONTENT
• Vectors, vector functions, inner and outer product, lines, planes, surfaces, arc length, unit tangent vector, TNB frame, multivariable functions, derivatives, limit, continuity. • Partial derivatives, chain differentiation, directional derivative, tangent planes, linearization, differentials, extrema and saddle points. • Taylor's theorem for multivariable functions. • Curvilinear coordinate systems, norm, gradient, divergence and curl. • Double and triple integrals in Cartesian and other coordinates, applications to the evaluation of areas, moments of inertia and centers of mass, change of variables (Jacobian determinants). • Integration of vector fields, line and surface integrals, path independence, potential functions and conservative fields, Green, Gauss and Stokes theorems and applications.

STUDENT LEARNING OBJECTIVES

In this course the student acquires the basic knowledge on multivariable and vector valued functions. This mathematical knowledge is necessary for the understanding of the physical laws and the ability to deal with problems that appear in all physics classes in the following semesters.

With the completion of the course the student is able to:

- Describe the formulation of physical phenomena that take place in the real three-dimensional space and laws that the variables involved are vectors.
- Approximately elaborate on useful and complicated expressions by expanding in appropriate parameters.
- Make use of differential and integral calculus to resolve problems in the three-dimensional space, as well as, restricted on subsets (curves and surfaces) of it.

TEACHING AND LEARNING METHODS - ASSESSMENT												
TEACHING METHOD	In Class (Face to Face)											
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	Learning process supported by the e-class platform.											
TEACHING ORGANIZATION <i>Describe in detail the way and methods of teaching:</i> Enhanced Lectures, Online Lectures, Seminars, Tutorial, Laboratory, Laboratory Exercise, Study & analysis of literature, Practice (Positioning), Interactive teaching, Developing a project, Individual / group work Telework (reference to tools)etc. <i>Details of the student's study hours for each learning activity and hours of non-guided study are shown to ensure that the total workload at the semester corresponds to the ECTS</i>	<table><tr><th>Activity</th><th>Student Workload (hours)</th></tr><tr><td>Lectures</td><td>52</td></tr><tr><td>Seminars</td><td>26</td></tr><tr><td>Individual Study/ Study and Analysis of bibliography / Preparation</td><td>140</td></tr><tr><td>Total Course (25 hours of workload per unit of credit)</td><td>218</td></tr></table>		Activity	Student Workload (hours)	Lectures	52	Seminars	26	Individual Study/ Study and Analysis of bibliography / Preparation	140	Total Course (25 hours of workload per unit of credit)	218
Activity	Student Workload (hours)											
Lectures	52											
Seminars	26											
Individual Study/ Study and Analysis of bibliography / Preparation	140											
Total Course (25 hours of workload per unit of credit)	218											
ASSESSMENT OF STUDENTS <i>Description of the assessment process</i> Assessment Methods, Formative or Concluding, Multiple Choice Test, Quick Response Questions, Test Development Questions, Problem Solving, Written Work, Report / Report, Oral Examination, Public Presentation, Laboratory Work, Other / Other <i>Fully defined evaluation criteria are mentioned and if and where they are accessible to students.</i>	<table><tr><th>Assessment methods</th><th>Number</th><th>Percentage</th></tr><tr><td>Final written exams</td><td>1</td><td>100%</td></tr></table>		Assessment methods	Number	Percentage	Final written exams	1	100%				
Assessment methods	Number	Percentage										
Final written exams	1	100%										

LITERATURE AND STUDY MATERIALS / READING LIST

- Διανυσματικός Λογισμός, Marsden J., A. Tromba, ΙΤΕ ΠΑΝ/ΚΕΣ ΕΚΔΟΣΕΙΣ ΚΡΗΤΗΣ,
- Απειροστικός Λογισμός (σε έναν Τόμο), B. Tomas, ΙΤΕ ΠΑΝ/ΚΕΣ ΕΚΔΟΣΕΙΣ ΚΡΗΤΗΣ,
- Απειροστικός Λογισμός σε πολλές μεταβλητές, Τ. Χατζηαφράτης, ΕΚΔΟΣΕΙΣ Σ.ΑΘΑΝΑΣΟΠΟΥΛΟΣ& ΣΙΑ Ο.Ε.,
- Εφαρμοσμένος Απειροστικός Λογισμός, Λ.Ν. Τσίτσας, ΕΚΔΟΣΕΙΣ Σ.ΑΘΑΝΑΣΟΠΟΥΛΟΣ& ΣΙΑ Ο.Ε.,
- Μαθηματικά II, Β' έκδοση, Θ. Μ. Ρασσίας, ΕΚΔΟΣΕΙΣ ΑΘ. ΤΣΟΤΡΑΣ

INSTITUTION	NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS					
SCHOOL	SCHOOL OF SCIENCE					
DEPARTMENT	INFORMATICS AND TELECOMMUNICATIONS					
COURSE LEVEL	UNDERGRADUATE					
COURSE TITLE	Probability and Statistics					
COURSE CODE	K13	Semester	3	ECTS	6	
TEACHING HOURS per week	THEORY	3	SEMINAR.	1	LABORATORY	0
COURSE TYPE	Compulsory (YM)					
URL	https://eclass.uoa.gr/courses/DI442/					
EXPECTED PRIOR KNOWLEDGE/ PREREQUISITES AND PREPARATION:						
TEACHING AND EXAMINATIONS LANGUAGE:	GREEK					
THE COURSE IS OFFERED TO ERASMUS STUDENTS	NO					

COURSE CONTENT
The objective of the course is the cultivation of the mathematical capabilities of the students in the modeling and quantitative study of situations that involve randomness. Moreover, the course comprises an introduction in the classical statistical inference. More specifically, the topics of the course are the following: • Sample space and events. Axiomatic foundations of Probability Theory. • Conditional probability. • Law of total probability and Bayes rule. • Independence of events. • Basic enumeration principles. Finite sample spaces and Laplace's definition of probability. • Discrete random variables: Probability mass function, mean value and variance. • Multidimensional discrete random variables: Joint probability mass function, conditioning, independence of random variables. • Continuous random variables: Probability density function, mean value and variance. • Multidimensional continuous random variables: Joint probability density functions, conditioning, independence of random variables. • Distributions of random variables. • Covariance and correlation coefficient. • Conditional expectation and variance.

- The Law of Large Numbers and the Central Limit Theorem.
- Introduction to Statistical Inference.
- Introduction to point and interval estimation.
- Linear Regression
- Introduction to hypothesis testing.

STUDENT LEARNING OBJECTIVES

Teaching-Learning Goals-Expected Learning Outcomes

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

- Describe the concepts of a random experiment, a sample space and an event.
- Describe the classical and the axiomatic foundations of Probability Theory and use the main properties of probability measure.
- Apply the basic enumeration principles and use the formulas for the number of permutations and combinations of a set of objects.
- Describe the concept of conditional probability and of the stochastic independence of events.
- Solve probability problems using the total probability theorem, Bayes' formula and the multiplication rule.
- Describe the concept of random variable, of distribution function, of probability mass function and of probability density function.
- Compute the moments of distributions, in particular the expectations and the variances.
- Recognize the most important special discrete and continuous distributions.
- Describe the concepts of multidimensional and in particular 2-dimensional random variables, its joint distribution function, joint probability mass function and joint probability density function.
- Describe the concept of independent random variables.
- Explain the notions of covariance and correlation coefficient and compute them for given pairs of random variables.
- Identify the concepts of probability generating functions and moment generating functions and compute them for given random variables.
- Explain the Central Limit Theorem and use it for approximate computations of probabilities.
- Estimate the unknown parameter of a distribution using the method of maximum likelihood estimates.
- Construct confidence intervals for the unknown parameters in the case of normal populations.
- Deduce conclusions regarding testing statistical hypotheses in case of normal populations or large sample sizes.

TEACHING AND LEARNING METHODS - ASSESSMENT

TEACHING METHOD	In Class (Face to Face)	
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	Learning process supported by the e-class platform (notes, Announcements, online quiz) Email communication	
TEACHING ORGANIZATION <i>Describe in detail the way and methods of teaching: Enhanced Lectures, Online Lectures,</i>	Activity	Student Workload (hours)
	Lectures	52

<i>Seminars, Tutorial, Laboratory, Laboratory Exercise, Study & analysis of literature, Practice (Positioning), Interactive teaching, Developing a project, Individual / group work Telework (reference to tools) etc.</i>	Tutorial	13	
	Laboratory	0	
	Teamwork in a case study	0	
	Small individual exercises	0	
	Independent Study	85	
	Total Course (25 hours of workload per unit of credit)		
	150		
<i>Details of the student's study hours for each learning activity and hours of non-guided study are shown to ensure that the total workload at the semester corresponds to the ECTS</i>			
ASSESSMENT OF STUDENTS <i>Description of the assessment process</i>	Describe explicitly methods, evaluation tools and provided feedback.		
	The table below is supplemented accordingly.		
	Assessment methods	Number	Percentage
<i>Fully defined evaluation criteria are mentioned and if and where they are accessible to students.</i>	Written examination	1	100%

LITERATURE AND STUDY MATERIALS / READING LIST
In English: 1. Bertsekas, D.P. and Tsitsiklis J. (2008) J. Introduction to Probability -2nd Edition, Athena Scientific. 2. Walpole, R.E., Myers, R.H., Myers, S.L. and Ye, K. (2007) Probability and Statistics for Engineers and Scientists, Pearson In Greek: 1. Δαμιανού, Χ.Χ., Παπαδάτου, Ν.Δ. και Χαραλαμπίδη, Χ.Α. (2010) Εισαγωγή στις Πιθανότητες και τη Στατιστική. Εκδόσεις Συμμετρία, Αθήνα.

INSTITUTION	NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS					
SCHOOL	SCHOOL OF SCIENCE					
DEPARTMENT	INFORMATICS AND TELECOMMUNICATIONS					
COURSE LEVEL	UNDERGRADUATE					
COURSE TITLE	Object-Oriented Programming					
COURSE CODE	K10	Semester	3	ECTS	8	
TEACHING HOURS per week	THEORY	3	SEMINAR.	1	LABORATORY	2
COURSE TYPE	Select one of the following and delete the rest Compulsory (YM)					
URL	https://eclass.uoa.gr/courses/D14/					
EXPECTED PRIOR KNOWLEDGE/ PREREQUISITES AND PREPARATION:	Recommended K04-Introduction to Programming					
TEACHING AND EXAMINATIONS LANGUAGE:	GREEK					
THE COURSE IS OFFERED TO ERASMUS STUDENTS	NO					

COURSE CONTENT
Introduction to object oriented programming concepts. The C++ programming language: basic language constructs, namespaces, overloading, objects and classes, inheritance and composition, templates, abstract classes, exception handling, introduction to the standard library. Introduction to the STL and generic programming. Quick introduction to Java. Overview other object oriented programming languages.

STUDENT LEARNING OBJECTIVES

Expected Learning Outcomes

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

- Program correctly within the object oriented paradigm
- Use correctly the object oriented C++ language constructs
- Use correctly the object oriented Java language constructs
- Explain the functionality of any C++ program
- Explain the functionality of any Java program
- Use any other object oriented programming language

TEACHING AND LEARNING METHODS - ASSESSMENT											
TEACHING METHOD	In Class (Face to Face)										
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	Learning process supported by web site page where all course material is uploaded as well as the course of the lectures Discussion forum , Announcements, Task assignments Email communication Live transmission of lectures Laboratory work										
TEACHING ORGANIZATION <i>Describe in detail the way and methods of teaching:</i> Enhanced Lectures, Online Lectures, Seminars, Tutorial, Laboratory, Laboratory Exercise, Study & analysis of literature, Practice (Positioning), Interactive teaching, Developing a project, Individual / group work Telework (reference to tools) etc. <i>Details of the student's study hours for each learning activity and hours of non-guided study are shown to ensure that the total workload at the semester corresponds to the ECTS</i>	During the lectures, students are divided into two groups. Slides are used as well as program code which is explained and executed to illustrate the theory. For the lab classes, students are divided into six groups and are urged to write their own code as an initial stage to the development of the code for the assignments. Any time during the semester, students can express any questions or views about the theory, the lab work or the assignments into the course's discussion forum. <table> <tr> <th>Activity</th><th>Student Workload (hours)</th></tr> <tr> <td>Lectures + Tutorials</td><td>52</td></tr> <tr> <td>Laboratory</td><td>20</td></tr> <tr> <td>Assignments / Independent Study</td><td>128</td></tr> <tr> <td>Total Course</td><td>200</td></tr> </table>	Activity	Student Workload (hours)	Lectures + Tutorials	52	Laboratory	20	Assignments / Independent Study	128	Total Course	200
Activity	Student Workload (hours)										
Lectures + Tutorials	52										
Laboratory	20										
Assignments / Independent Study	128										
Total Course	200										

ASSESSMENT OF STUDENTS

Description of the assessment process

Assessment Methods, Formative or Concluding, Multiple Choice Test, Quick Response Questions, Test Development Questions, Problem Solving, Written Work, Report / Report, Oral Examination, Public Presentation, Laboratory Work, Other / Other

Fully defined evaluation criteria are mentioned and if and where they are accessible to students.

The requirements of the course consist of a written exam plus a sequence of practical work assignments. These are exercises of C++ and Java programs and a final project in C++ and are also examined orally.

Assessment methods	Number	Percentage
<i>Written examination</i>	1	70%
<i>Exercises</i>	4	20%
<i>Project</i>	1	10%

LITERATURE AND STUDY MATERIALS / READING LIST

- I. Karali, "Object Oriented Programming: Lecture Notes", 2010
- I. Karali, "The Java Programming Language: Lecture Notes", 2014
- Bruce Eckel, "Thinking in C++ (Volume 1)", 2nd Edition (Greek Edition, 2009)
- Bjarne Stroustrup, "The C++ Programming Language", 4th Edition (Greek Edition, 2014)
- Bjarne Stroustrup, "Programming: Principles and Practice Using C++", 2nd Edition (Greek Edition, 2009)

INSTITUTION	NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS																			
SCHOOL	SCHOOL OF SCIENCE																			
DEPARTMENT	INFORMATICS AND TELECOMMUNICATIONS																			
COURSE LEVEL	UNDERGRADUATE																			
COURSE TITLE	Signals and Systems																			
COURSE CODE	K11	Semester	3	ECTS	6															
TEACHING HOURS per week	THEORY	3	SEMINAR.	1	LABORATORY	0														
COURSE TYPE	Select one of the following and delete the rest Compulsory (YM) <table border="1"> <thead> <tr> <th>K</th><th>E1</th><th>E2</th><th>E3</th><th>E4</th><th>E5</th><th>E6</th></tr> </thead> <tbody> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </tbody> </table> <i>Fill the table as in the curriculum: Track (A-Computer Science, B- Computer Engineering) / Specialization Compulsory (Y) / Core Specialization (B)/ Elective Specialization (E)</i>						K	E1	E2	E3	E4	E5	E6							
K	E1	E2	E3	E4	E5	E6														
URL	https://eclass.uoa.gr/courses/DI430/																			
EXPECTED PRIOR KNOWLEDGE/ PREREQUISITES AND PREPARATION:																				
TEACHING AND EXAMINATIONS LANGUAGE:	GREEK																			
THE COURSE IS OFFERED TO ERASMUS STUDENTS	NO																			

COURSE CONTENT
Basic classes of signals, spectrum representation of periodic and non-periodic signals, main classes of systems, convolution-based representation, state models, representation of systems with differential equations and finite difference equations, Fourier, Laplace and Z transforms, Bode diagrams, stability, sampling and quantisation.

STUDENT LEARNING OBJECTIVES
Course objectives: - To provide an overview of what is a signal and classify the various signals according to their main characteristics - To provide an overview of what is a system and classify them according with the number and the kind of their inputs and outputs general as well as to describe their main characteristics

- To familiarize students with the formulation, the mathematical tools and the applications of the Fourier transform for the analogue and the discrete signals
- To introduce the Fourier, Laplace and Z transforms and their main properties.

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

- Recognise, categorize and classify the signals and the systems
- Select and apply basic signal processing methodologies
- Specify, analyze and apply in practice appropriate systems and handling tools and signal transformation, such as the Fourier analysis and the Laplace or Z transformations

TEACHING AND LEARNING METHODS - ASSESSMENT													
TEACHING METHOD	In Class (Face to Face)												
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	Learning process supported by the e-class platform (Provision of educational content, Announcements, Discussions) Email communication Live transmission of lectures Ability to track recorded lectures												
TEACHING ORGANIZATION <i>Describe in detail the way and methods of teaching:</i> Enhanced Lectures, Online Lectures, Seminars, Tutorial, Laboratory, Laboratory Exercise, Study & analysis of literature, Practice (Positioning), Interactive teaching, Developing a project, Individual / group work Telework (reference to tools) etc. <i>Details of the student's study hours for each learning activity and hours of non-guided study are shown to ensure that the total workload at the semester corresponds to the ECTS</i>	The theory is presented with power-point slides that are available in the e-class. More solution of more than 50 exercises are explained during the tutorials. <table border="1"> <thead> <tr> <th>Activity</th><th>Student Workload (hours)</th></tr> </thead> <tbody> <tr> <td>Lectures (attendance)</td><td>39</td></tr> <tr> <td>Tutorial (attendance)</td><td>13</td></tr> <tr> <td>Independent Study of exercises</td><td>48</td></tr> <tr> <td>Independent Study of theory</td><td>50</td></tr> <tr> <td>Total Course (25 hours of workload per unit of credit)</td><td>150</td></tr> </tbody> </table>	Activity	Student Workload (hours)	Lectures (attendance)	39	Tutorial (attendance)	13	Independent Study of exercises	48	Independent Study of theory	50	Total Course (25 hours of workload per unit of credit)	150
Activity	Student Workload (hours)												
Lectures (attendance)	39												
Tutorial (attendance)	13												
Independent Study of exercises	48												
Independent Study of theory	50												
Total Course (25 hours of workload per unit of credit)	150												

ASSESSMENT OF STUDENTS

Description of the assessment process

Assessment Methods, Formative or Concluding, Multiple Choice Test, Quick Response Questions, Test Development Questions, Problem Solving, Written Work, Report / Report, Oral Examination, Public Presentation, Laboratory Work, Other / Other

Fully defined evaluation criteria are mentioned and if and where they are accessible to students.

The evaluation method is based on a written examination with exercises of variable difficulty. Students can access the errors on their written examinations and ask for a regrading.

Assessment methods	Number	Percentage
Written examination	1	100%

LITERATURE AND STUDY MATERIALS / READING LIST

- S. Karabogias "Signals and Systems", University of Athens edition, 2009, ISBN 978-960-931517-3 (in Greek)
- N. Kalouptidis "Signals, Systems and Algorithms", DIAVLOS editions, 1993 (in Greek)
- S. Theodoridis, K. Berberidis, L. Kofidis "Introduction to Signals' and Systems' Theory" G. Dardanos & K. Dardanos editions, 2003 (in Greek)

INSTITUTION	NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS						
SCHOOL	SCHOOL OF SCIENCE						
DEPARTMENT	INFORMATICS AND TELECOMMUNICATIONS						
COURSE LEVEL	UNDERGRADUATE						
COURSE TITLE	Algorithms and Complexity						
COURSE CODE	K17		Semester	4	ECTS	8	
TEACHING HOURS per week	THEORY	4	SEMINAR.	2	LABORATORY		
COURSE TYPE	Compulsory (YM)						
	K	E1	E2	E3	E4	E5	E6
URL	https://eclass.uoa.gr/courses/D469/						
EXPECTED PRIOR KNOWLEDGE/ PREREQUISITES AND PREPARATION:	Data Structures and Programming Techniques K08, Discrete Mathematics K09						
TEACHING AND EXAMINATIONS LANGUAGE:	GREEK						
THE COURSE IS OFFERED TO ERASMUS STUDENTS	YES						

COURSE CONTENT
The course introduces the concepts of algorithm design and analysis and presents the basic mathematical tools used to evaluate its performance. It describes the union and find technique and presents the fundamental techniques of search in graphs, BFS and DFS. The course focuses on the three basic methods of algorithm design, "divide and conquer", greedy algorithms and dynamic programming. It analyzes the characteristics of each method and highlights the practical problems that are effectively solved by each method. It defines the decision problems and the classes P and NP. It describes the concept of the reduction and identifies NP-complete and NP-hard problems.

STUDENT LEARNING OBJECTIVES
Teaching-Learning Goals-Expected Learning Outcomes Introduces students to basic algorithm design techniques. Provides students with tools for evaluating the performance of algorithms and choosing the most appropriate algorithm to solve a practical problem. Aids students to appreciate the role of algorithms in computer science.

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

- describe algorithms in pseudocode
- specify the asymptotic evaluation of the running time of an algorithm
- compare the performance of two algorithms
- assess the suitability of an algorithm for a problem
- use the basic algorithmic problem-solving techniques
- recognize the difficulty of resolving efficiently some practical problems
- give examples of problems that are characterized as easy and problems that are characterized as difficult
- describe the three algorithm design methods: "divide and conquer", greediness and dynamic programming.
- give specific examples for each method: merge sort, quick sort, activity selection, shortest paths, 0-1 knapsack, longest paths in DAG's, longest common subsequence
- efficiently check connectivity in a graph and find optimally connected components
- give examples of problems that are NP-complete

TEACHING AND LEARNING METHODS - ASSESSMENT																	
TEACHING METHOD	In Class (Face to Face)																
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	Learning process supported by the e-class platform: course description, provision of material, announcements, assignments and upload Contact via e-mail Live transmission of lectures Ability to track recorded lectures																
TEACHING ORGANIZATION <i>Describe in detail the way and methods of teaching:</i> Enhanced Lectures, Online Lectures, Seminars, Tutorial, Laboratory, Laboratory Exercise, Study & analysis of literature, Practice (Positioning), Interactive teaching, Developing a project, Individual / group work Telework (reference to tools) etc. <i>Details of the student's study hours for each learning activity and hours of non-guided study are shown to ensure that the total workload at the semester corresponds to the ECTS</i>	Use of slides in lectures. There are 3 individual assignments focusing on 1) asymptotic complexity, 2) the "divide and conquer" technique and greedy algorithms, and 3) dynamic programming. <table border="1"> <thead> <tr> <th>Activity</th><th>Student Workload (hours)</th></tr> </thead> <tbody> <tr> <td>Lectures (in class)</td><td>52</td></tr> <tr> <td>Tutorial (in class)</td><td>26</td></tr> <tr> <td>Assignment 1 (individual)</td><td>26</td></tr> <tr> <td>Assignment 2 (individual)</td><td>26</td></tr> <tr> <td>Assignment 3 (individual)</td><td>26</td></tr> <tr> <td>Final written exam</td><td>44</td></tr> <tr> <td>Total Course (25 hours of workload per unit of credit)</td><td>200</td></tr> </tbody> </table>	Activity	Student Workload (hours)	Lectures (in class)	52	Tutorial (in class)	26	Assignment 1 (individual)	26	Assignment 2 (individual)	26	Assignment 3 (individual)	26	Final written exam	44	Total Course (25 hours of workload per unit of credit)	200
Activity	Student Workload (hours)																
Lectures (in class)	52																
Tutorial (in class)	26																
Assignment 1 (individual)	26																
Assignment 2 (individual)	26																
Assignment 3 (individual)	26																
Final written exam	44																
Total Course (25 hours of workload per unit of credit)	200																

ASSESSMENT OF STUDENTS

Description of the assessment process

Assessment Methods, Formative or Concluding, Multiple Choice Test, Quick Response Questions, Test Development Questions, Problem Solving, Written Work, Report / Report, Oral Examination, Public Presentation, Laboratory Work, Other / Other

Fully defined evaluation criteria are mentioned and if and where they are accessible to students.

Students are assessed with 3 assignments and a final written exam.

Assessment methods	Number	Percentage
Written examination	1	85%
Assignments	3	15%

Evaluation criteria are accessible to students through e-class.

LITERATURE AND STUDY MATERIALS / READING LIST

1. Th. H. Cormen, CH. E. Leiserson, R. L. Rivest and C. Stein, Introduction to algorithms, MIT-Press, 2009, 3rd edition, MIT Press, <http://mitpress.mit.edu/algorithms/> (Eudoxus).

2. Jon Kleinberg & Eva Tardos, Algorithm Design, Addison – Wesley, 2006 (Eudoxus).

3. S. Dasgupta, C. H. Papadimitriou & U. V. Vazirani, Algorithms, McGraw-Hill, 2008 (Eudoxus)

• Other material:

- notes, Algorithms and Complexity, 2016,

<https://eclass.uoa.gr/modules/document/index.php?course=D469&openDir=/4c2b32c4z3e6>

- slides,

<https://eclass.uoa.gr/modules/document/index.php?course=D469&openDir=/4c2b32c4rt6n>

INSTITUTION	NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS						
SCHOOL	SCHOOL OF SCIENCE						
DEPARTMENT	INFORMATICS AND TELECOMMUNICATIONS						
COURSE LEVEL	UNDERGRADUATE						
COURSE TITLE	Design and Use of Database Systems						
COURSE CODE	K29		Semester	4	ECTS	7	
TEACHING HOURS per week	THEORY	3	SEMINAR.	1	LABORATORY	1	
COURSE TYPE	Select one of the following and delete the rest						
	Compulsory (YM)						
	K	E1	E2	E3	E4	E5	E6
URL	https://eclass.uoa.gr/courses/D47/						
EXPECTED PRIOR KNOWLEDGE/ PREREQUISITES AND PREPARATION:	K08						
TEACHING AND EXAMINATIONS LANGUAGE:	GREEK						
THE COURSE IS OFFERED TO ERASMUS STUDENTS	NO						

COURSE CONTENT
The course covers the upper levels of a database management system (DBMS), i.e. the conceptual and external or view levels. Specifically, the course provides students with an overview of databases; database history; the different conceptual models used to design a database, in particular the Entity-Relationship (E-R) model; the translation from the E-R to the Relational Model; Functional Dependencies and Normalization; the Relational Model; the Structured Query Language (SQL) to access and manipulate databases, the Query-By-Example language (QBE), Views and Constraints; Relational Algebra; the design and development of web applications to interface with databases using e.g., python, PHP, JDBC.

STUDENT LEARNING OBJECTIVES
To introduce students to relational database concepts, data modeling, the interaction and manipulation of data with the use of SQL, and the design of applications to interface with databases. Upon successful completion of the course the student will be able to: • Design conceptually and model how data is structured and organized • Use the Entity-Relationship model and draft E-R diagrams using modeling tools such as MySQL Workbench

- Design relational databases using the Relational Model
- Optimize database schemas with Normalization
- Define retrieval queries, specify Constraints and perform operations on a database using SQL
- Define basic retrieval queries using Relational Algebra
- Develop web applications to interface with databases using the Python programming language

TEACHING AND LEARNING METHODS - ASSESSMENT																				
TEACHING METHOD	In Class (Face to Face)																			
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	Learning process supported through the use of the e-class platform (Teaching material; Announcements; Discussions on projects and laboratory assignments; Task assignments; Student groups; External links and related resources) Email communication Live transmission of lectures Ability to view recorded lectures Programming support via laboratory seminars																			
TEACHING ORGANIZATION	<table><tr><th>Activity</th><th>Student Workload (hours)</th></tr><tr><td>Lectures (physical presence)</td><td>39</td></tr><tr><td>Seminars (physical presence)</td><td>13</td></tr><tr><td>Laboratory practice (physical presence)</td><td>13</td></tr><tr><td>Group project #1 (team of 2-3)</td><td>30</td></tr><tr><td>Individual project #2</td><td>30</td></tr><tr><td>Group project #3 (team of 2-3)</td><td>30</td></tr><tr><td>Independent Study</td><td>20</td></tr><tr><td>Total Course (25 hours of workload per unit of credit)</td><td>175</td></tr></table>		Activity	Student Workload (hours)	Lectures (physical presence)	39	Seminars (physical presence)	13	Laboratory practice (physical presence)	13	Group project #1 (team of 2-3)	30	Individual project #2	30	Group project #3 (team of 2-3)	30	Independent Study	20	Total Course (25 hours of workload per unit of credit)	175
Activity	Student Workload (hours)																			
Lectures (physical presence)	39																			
Seminars (physical presence)	13																			
Laboratory practice (physical presence)	13																			
Group project #1 (team of 2-3)	30																			
Individual project #2	30																			
Group project #3 (team of 2-3)	30																			
Independent Study	20																			
Total Course (25 hours of workload per unit of credit)	175																			
Describe in detail the way and methods of teaching: Enhanced Lectures, Online Lectures, Seminars, Tutorial, Laboratory, Laboratory Exercise, Study & analysis of literature, Practice (Positioning), Interactive teaching, Developing a project, Individual / group work Telework (reference to tools) etc. Details of the student's study hours for each learning activity and hours of non-guided study are shown to ensure that the total workload at the semester corresponds to the ECTS																				
ASSESSMENT OF STUDENTS	<table><tr><td colspan="3">Evaluation of theory by written examination and design and programming by a compulsory project consisting of 3 parts. Grade Feedback is given in the written examination at the level of questions. In the project a rubric is given and feedback is provided accordingly with explanations in case of missing grades.</td></tr><tr><th>Assessment methods</th><th>Number</th><th>Percentage</th></tr><tr><td>Written examination</td><td>1</td><td>50%</td></tr><tr><td>Project</td><td>1</td><td>50%</td></tr></table>		Evaluation of theory by written examination and design and programming by a compulsory project consisting of 3 parts. Grade Feedback is given in the written examination at the level of questions. In the project a rubric is given and feedback is provided accordingly with explanations in case of missing grades.			Assessment methods	Number	Percentage	Written examination	1	50%	Project	1	50%						
Evaluation of theory by written examination and design and programming by a compulsory project consisting of 3 parts. Grade Feedback is given in the written examination at the level of questions. In the project a rubric is given and feedback is provided accordingly with explanations in case of missing grades.																				
Assessment methods	Number	Percentage																		
Written examination	1	50%																		
Project	1	50%																		
Description of the assessment process Assessment Methods, Formative or Concluding, Multiple Choice Test, Quick Response Questions, Test Development Questions, Problem Solving, Written Work, Report / Report, Oral Examination, Public Presentation, Laboratory Work, Other / Other Fully defined evaluation criteria are mentioned and if and where they are accessible to students.																				

LITERATURE AND STUDY MATERIALS / READING LIST

Basic Book

Elmasri, R., & Navathe, S. B. (2015). *Fundamentals of Database Systems* (7th Edition). Pearson. Edited and translated in Greek by Prof. M. Chatzopoulos.

Ullman, J. D., & Widom, J. (2007). *A First Course in Database Systems* (2nd ed.). Prentice Hall. Translated in Greek.

Notes, presentations, tutorials on programming and tools are provided on e-class.

INSTITUTION	NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS																			
SCHOOL	SCHOOL OF SCIENCE																			
DEPARTMENT	INFORMATICS AND TELECOMMUNICATIONS																			
COURSE LEVEL	UNDERGRADUATE																			
COURSE TITLE	Communications Systems																			
COURSE CODE	K21	Semester	4	ECTS	7															
TEACHING HOURS per week	THEORY	3	SEMINAR.	1	LABORATORY	1														
COURSE TYPE	Select one of the following and delete the rest Compulsory (YM) <table border="1"> <thead> <tr> <th>K</th><th>E1</th><th>E2</th><th>E3</th><th>E4</th><th>E5</th><th>E6</th></tr> </thead> <tbody> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </tbody> </table> Fill the table as in the curriculum: Track (A-Computer Science, B- Computer Engineering) / Specialization Compulsory (Y) / Core Specialization (B)/ Elective Specialization (E)						K	E1	E2	E3	E4	E5	E6							
K	E1	E2	E3	E4	E5	E6														
URL	https://eclass.uoa.gr/courses/DI366/																			
EXPECTED PRIOR KNOWLEDGE/ PREREQUISITES AND PREPARATION:	Signals and Systems (K11)																			
TEACHING AND EXAMINATIONS LANGUAGE:	GREEK																			
THE COURSE IS OFFERED TO ERASMUS STUDENTS	NO																			

COURSE CONTENT
Introduction to Communications Systems, Review of fundamental principles of Signals Theory, Random Processes and Noise, Analog Processes (Amplitude and Frequency Modulation), Analog to Digital and Digital to Analog Signal Conversion, An introduction to Digital Communication Systems, Laboratory Simulation of Communication Systems in Matlab

STUDENT LEARNING OBJECTIVES
Course objectives: - to provide an overview of random process and its characteristics - to provide an overview of noise and describe the main characteristics of white, Gaussian and bandpass noise

- to introduce the main principles of amplitude and phase modulation and to familiarize students with their application to analog communication systems
- to present the procedure of the analog-to-digital and digital-to-analog signal conversion as well as the process of signal sampling (Nyquist theorem), signal quantization and coding
- to provide an overview of the characteristics of the transmitter, the channel and the receiver

After the successful completion of the course the student could:

- Describe the basic principles of analog communication systems
- Explain the process of analog-to-digital and digital-to-analog signal conversion
- interpret the basic concepts of digital communication systems operating in the presence of additive white Gaussian noise

Laboratory objectives:

- to provide an overview of the Matlab environment
- to provide the representation and process of continuous- and discrete-time signals in Matlab
- to familiarize students with the formulation of linear continuous-time signals
- to provide the process of random processes creation and noise in Matlab
- to provide computer simulation of signal sampling and signal quantization in Matlab
- to provide computer simulation of amplitude and frequency modulation

After the successful completion of the laboratory the student could:

- write functions and m files in Matlab
- create signals and interpret their graphical representation
- explain the Analog-to-Digital and Digital-to-Analog Signal Conversion

TEACHING AND LEARNING METHODS - ASSESSMENT		
TEACHING METHOD	In Class (Face to Face)	
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	Learning process supported by the e-class platform (Provision of educational content, Announcements, Discussions) Email communication Live transmission of lectures Ability to track recorded lectures	
TEACHING ORGANIZATION	The theory is presented with power-point slides that are available in the e-class. More solution of more than 50 exercises are explained during the tutorials.	
<i>Describe in detail the way and methods of teaching:</i> Enhanced Lectures, Online Lectures, Seminars, Tutorial, Laboratory, Laboratory Exercise, Study & analysis of literature, Practice (Positioning), Interactive teaching, Developing a project, Individual / group work Telework (reference to tools) etc.	Activity	Student Workload (hours)
	Lectures (attendance)	39
	Tutorial (attendance)	13
	Independent Study of exercises	48

<i>Details of the student's study hours for each learning activity and hours of non-guided study are shown to ensure that the total workload at the semester corresponds to the ECTS</i>	Independent Study of theory	42
	Laboratory	8
	Total Course (25 hours of workload per unit of credit)	150
ASSESSMENT OF STUDENTS <i>Description of the assessment process</i> <i>Assessment Methods, Formative or Concluding, Multiple Choice Test, Quick Response Questions, Test Development Questions, Problem Solving, Written Work, Report / Report, Oral Examination, Public Presentation, Laboratory Work, Other / Other</i> <i>Fully defined evaluation criteria are mentioned and if and where they are accessible to students.</i>	The evaluation method is based on a written examination with exercises of variable difficulty. After the marks have been announced, all students can review the marking on their written examinations and ask for a re-evaluation of their exam.	
	Assessment methods	Number
	Written examination	1
	Laboratory examination	1
		Percentage
		80%
		20%

LITERATURE AND STUDY MATERIALS / READING LIST
G. Karagiannidis and K. Pappi "Communicational Systems", A. Tziolas, 4th edition 2017 (in Greek) H. Taub and D. L. Schilling "Principles of Telecommunication Systems", A. Tziolas, 3rd edition 2017 (in Greek)

INSTITUTION	NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS									
SCHOOL	SCHOOL OF SCIENCE									
DEPARTMENT	INFORMATICS AND TELECOMMUNICATIONS									
COURSE LEVEL	UNDERGRADUATE									
COURSE TITLE	Communication Networks I									
COURSE CODE	K16		Semester	4	ECTS	6				
TEACHING HOURS per week	THEORY	3	SEMINAR.	1	LABORATORY					
COURSE TYPE	Compulsory Courses (YM)									
	K	E1	E2	E3	E4	E5	E6			
URL	https://eclass.uoa.gr/courses/DI410/									
EXPECTED PRIOR KNOWLEDGE/ PREREQUISITES AND PREPARATION:										
TEACHING AND EXAMINATIONS LANGUAGE:	GREEK									
THE COURSE IS OFFERED TO ERASMUS STUDENTS	NO									

COURSE CONTENT
The course covers the following topics: Basic concepts and design principles of communication networks. Structure of the Internet, history of the Internet. Application layer (HTTP, FTP, e-mail, DNS, P2P, Content Delivery Networks). Functionality of transport layer (TCP, UDP, flow control, congestion control). Network layer (routers, addressing, IP protocol, routing algorithms and protocols). Generalized forwarding and SDN. Network management and SNMP. Link layer (error detection techniques, multiple access protocols, local area networks (Ethernet, VLANs), virtual links (MPLS)).

STUDENT LEARNING OBJECTIVES
Teaching-Learning Goals-Expected Learning Outcomes Introduction to the Internet architecture, its primary applications as well as the functionality of the protocols used.

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

- Explain the principles of operation and the design aspects of communication networks
- Mention and compare the basic characteristics of various network technologies and applications
- Identify the different functionality of networking/switching devices
- Compare and assess the functions of the basic protocols that govern the application, transport, network and link layers
- Describe the flow control and congestion control mechanisms, as well as the different choices in routing traffic in the Internet

TEACHING AND LEARNING METHODS - ASSESSMENT											
TEACHING METHOD	In Class (Face to Face)										
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	Learning process supported by the e-class platform for accessing the course's digital educational content (Power Point Presentations, Recorded Videolectures, Interactive Elements, Self-Assessment Exercises, References) and announcements. Email communication Live streaming of lectures On demand access of recorded lectures										
TEACHING ORGANIZATION <i>Describe in detail the way and methods of teaching:</i> Enhanced Lectures, Online Lectures, Seminars, Tutorial, Laboratory, Laboratory Exercise, Study & analysis of literature, Practice (Positioning), Interactive teaching, Developing a project, Individual / group work Telework (reference to tools) etc.	<table> <tr> <th>Activity</th><th>Student Workload (hours)</th></tr> <tr> <td>Lectures</td><td>39</td></tr> <tr> <td>Exercises</td><td>13</td></tr> <tr> <td>Study</td><td>98</td></tr> <tr> <td>Total Course (25 hours of workload per unit of credit)</td><td>150</td></tr> </table> <i>Details of the student's study hours for each learning activity and hours of non-guided study are shown to ensure that the total workload at the semester corresponds to the ECTS</i>	Activity	Student Workload (hours)	Lectures	39	Exercises	13	Study	98	Total Course (25 hours of workload per unit of credit)	150
Activity	Student Workload (hours)										
Lectures	39										
Exercises	13										
Study	98										
Total Course (25 hours of workload per unit of credit)	150										

ASSESSMENT OF STUDENTS

Description of the assessment process

Assessment Methods, Formative or Concluding, Multiple Choice Test, Quick Response Questions, Test Development Questions, Problem Solving, Written Work, Report / Report, Oral Examination, Public Presentation, Laboratory Work, Other / Other

Fully defined evaluation criteria are mentioned and if and where they are accessible to students.

Students are evaluated based on written exams.

If requested, the exam problems and their solutions are discussed with the students after the exams.

Assessment methods	Number	Percentage
Final written examination	1	100%

LITERATURE AND STUDY MATERIALS / READING LIST

Main text

- Computer Networking, J. Kurose και K. Ross, Pearson/Addison-Wesley, Greek Translation, Giourdas Publishing

Additional reading

- Computer Networks, A.Tanenbaum and D.Wetherall, Greek Translation, Klidarithmos Publishing
- Computer Networks, L.Peterson and B.Davie, Greek Translation, Klidarithmos Publishing

INSTITUTION	NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS																			
SCHOOL	SCHOOL OF SCIENCE																			
DEPARTMENT	INFORMATICS AND TELECOMMUNICATIONS																			
COURSE LEVEL	UNDERGRADUATE																			
COURSE TITLE	Operating Systems																			
COURSE CODE	K22	Semester	5	ECTS	6															
TEACHING HOURS per week	THEORY	4	SEMINAR.		LABORATORY															
COURSE TYPE	Select one of the following and delete the rest Compulsory (YM) <table border="1"> <thead> <tr> <th>K</th><th>E1</th><th>E2</th><th>E3</th><th>E4</th><th>E5</th><th>E6</th></tr> </thead> <tbody> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </tbody> </table> Fill the table as in the curriculum: Track (A-Computer Science, B- Computer Engineering) / Specialization Compulsory (Y) / Core Specialization (B)/ Elective Specialization (E)						K	E1	E2	E3	E4	E5	E6							
K	E1	E2	E3	E4	E5	E6														
URL	http://www.di.uoa.gr/~ad/k22																			
EXPECTED PRIOR KNOWLEDGE/ PREREQUISITES AND PREPARATION:	K08 Data Structure and Programming Techniques																			
TEACHING AND EXAMINATIONS LANGUAGE:	GREEK																			
THE COURSE IS OFFERED TO ERASMUS STUDENTS																				

COURSE CONTENT
The objective of the course is to introduce the fundamental concepts and principles that modern Operating Systems use to both manage resources and help users develop effective applications. Classic concepts including batch processing, time sharing, kernel design, interfaces, system programs, system calls, services, multi-programming, process synchronization, shared memory, resource allocation schemes and pertinent policies, multi-threading, file system structures as well as basic security mechanisms are introduced. The study of the subject is balanced with programming and homework assignments throughout the semester. The course requires both independent and consistent effort from the student.

STUDENT LEARNING OBJECTIVES

Teaching-Learning Goals-Expected Learning Outcomes

To introduce basic concepts and modules of contemporary Operating Systems and present the interaction and the policies used by these elements

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

- Describe and manage the interface between user programs and the OS and its services.
- Define, design and implement basic services with the help of Unix system calls.
- Designate, design and develop APIs for libraries created.
- Explain and program inter-process communication mechanisms in Unix.
- Design, implement, and evaluate programs pertinent to the use of memory and I/O services.
- Define, design and develop system programs in the Unix environment while using C/C++ and pertinent libraries.

TEACHING AND LEARNING METHODS – ASSESSMENT

TEACHING METHOD	In Class (Face to Face)												
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	Learning process supported by class web page and Piazza.com class forum. Posted class materials (www.di.uoa.gr/~ad/k22) include: course description and syllabus, slides, announcements, programming assignments, discussions on programming assignments, and pointers to external links.												
TEACHING ORGANIZATION <i>Describe in detail the way and methods of teaching:</i> Enhanced Lectures, Online Lectures, Seminars, Tutorial, Laboratory, Laboratory Exercise, Study & analysis of literature, Practice (Positioning), Interactive teaching, Developing a project, Individual / group work Telework (reference to tools) etc.	<table border="1"> <thead> <tr> <th>Activity</th><th>Student Workload (hours)</th></tr> </thead> <tbody> <tr> <td>Lectures</td><td>52</td></tr> <tr> <td>Programming Projects (4)</td><td>56</td></tr> <tr> <td>Homework Assignments(3-4)</td><td>16</td></tr> <tr> <td>Independent Study</td><td>26</td></tr> <tr> <td>Total Course (25 hours of workload per unit of credit)</td><td>150</td></tr> </tbody> </table> <i>Details of the student's study hours for each learning activity and hours of non-guided study are shown to ensure that the total workload at the semester corresponds to the ECTS</i>	Activity	Student Workload (hours)	Lectures	52	Programming Projects (4)	56	Homework Assignments(3-4)	16	Independent Study	26	Total Course (25 hours of workload per unit of credit)	150
Activity	Student Workload (hours)												
Lectures	52												
Programming Projects (4)	56												
Homework Assignments(3-4)	16												
Independent Study	26												
Total Course (25 hours of workload per unit of credit)	150												

ASSESSMENT OF STUDENTS

Description of the assessment process

Assessment Methods, Formative or Concluding, Multiple Choice Test, Quick Response Questions, Test Development Questions, Problem Solving, Written Work, Report / Report, Oral Examination, Public Presentation, Laboratory Work, Other / Other

Fully defined evaluation criteria are mentioned and if and where they are accessible to students.

Students are evaluated via final written exam and programming assignments. Programming assignments are graded via oral exam. Re-grades of exam and assignments are possible.

Assessment methods	Number	Percentage
Midterm examination	1	17%
Final Examination	1	30%
Progr. Assignment	4	48%
Homework Assign.	3-4	9%

LITERATURE AND STUDY MATERIALS / READING LIST

Textbook: A. Silberschatz, P.B. Galvin, G. Gagne, Operating System Concepts, 9th Edition, John Wiley & Sons, Inc., 2013.

Secondary Textbook: R. Arpaci-Dusseau and A. Arpaci-Dusseau, Operating Systems: Three Easy Pieces, Arpaci-Dusseau Books, LLC, 2016.

INSTITUTION	NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS																			
SCHOOL	SCHOOL OF SCIENCE																			
DEPARTMENT	INFORMATICS AND TELECOMMUNICATIONS																			
COURSE LEVEL	UNDERGRADUATE																			
COURSE TITLE	Systems Programming																			
COURSE CODE	K24	Semester	5	ECTS	6															
TEACHING HOURS per week	THEORY	4	SEMINAR.		LABORATORY															
COURSE TYPE	Select one of the following and delete the rest Compulsory <table border="1"> <tr> <td>K</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </table> Fill the table as in the curriculum: Track (A-Computer Science, B- Computer Engineering) / Specialization Compulsory (Y) / Core Specialization (B)/ Elective Specialization (E)						K													
K																				
URL	http://cgi.di.uoa.gr/~mema/courses/k24/k24.html http://cgi.di.uoa.gr/~antoulas/k24/																			
EXPECTED PRIOR KNOWLEDGE/ PREREQUISITES AND PREPARATION:	K08 Data Structure and Programming Techniques																			
TEACHING AND EXAMINATIONS LANGUAGE:	GREEK																			
THE COURSE IS OFFERED TO ERASMUS STUDENTS																				

COURSE CONTENT
This course examines in depth the Unix environment as a development environment. We will look at the Linux API for the C / C ++ languages as well as the Linux shell. We will cover topics such as: basic Unix commands, shell programming, script languages, programming of system functions in C / C ++ for error handling, creation and termination of processes, sending / receiving signals, low-level input / output system calls, communication between local processes, creation, termination and synchronization of threads, file system management, as well as network programming. This course requires independent and consistent effort from the student.

STUDENT LEARNING OBJECTIVES
Upon successful completion of the course the student will be able to: • Use basic Unix commands and navigate/manage a Unix file system

- Develop shell programs and program with script languages
- Explain and program Unix inter-process communication mechanisms
- Design, implement, and evaluate multi-threaded programs
- Design, implement and evaluate network programs (Internet applications)

TEACHING AND LEARNING METHODS – ASSESSMENT			
TEACHING METHOD	In Class (Face to Face)		
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	Learning process supported by class web page and Piazza class forum. Posted class materials include: course description and syllabus, slides, announcements, programming assignments, discussions on programming assignments, and pointers to external links.		
TEACHING ORGANIZATION			
<i>Describe in detail the way and methods of teaching:</i> Enhanced Lectures, Online Lectures, Seminars, Tutorial, Laboratory, Laboratory Exercise, Study & analysis of literature, Practice (Positioning), Interactive teaching, Developing a project, Individual / group work Telework (reference to tools) etc.			
<i>Details of the student's study hours for each learning activity and hours of non-guided study are shown to ensure that the total workload at the semester corresponds to the ECTS</i>			
ASSESSMENT OF STUDENTS			
	<i>Description of the assessment process</i>		
	Assessment Methods, Formative or Concluding, Multiple Choice Test, Quick Response Questions, Test Development Questions, Problem Solving, Written Work, Report / Report, Oral Examination, Public Presentation, Laboratory Work, Other / Other		
	Fully defined evaluation criteria are mentioned and if and where they are accessible to students.		
	Students are evaluated via final written exam and programming assignments. Programming assignments are graded via oral exam. Re-grades of exam and assignments are possible.		
	Assessment methods	Number	Percentage
	Written examination	1	50%
	Programming assignments	3-4	50%

LITERATURE AND STUDY MATERIALS / READING LIST
Peter S. Pacheco. M.J. Rochkind, <u>Advanced Unix Programming</u> , Prentice-Hall Software Series, Englewood Cliffs, NJ, 2004.

Kay Robbins, Steven Robbins, "Unix Systems Programming: Communication, Concurrency, and Threads", Prentice Hall PTR, 2003.

B. OPTIONAL LABORATORY (EP)

INSTITUTION	NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS																			
SCHOOL	SCHOOL OF SCIENCE																			
DEPARTMENT	INFORMATICS AND TELECOMMUNICATIONS																			
COURSE LEVEL	UNDERGRADUATE																			
COURSE TITLE	Logic Design Lab																			
COURSE CODE	K02ε	Semester	1	ECTS	2															
TEACHING HOURS per week	THEORY		SEMINAR.		LABORATORY	2hours/group														
COURSE TYPE	Select one of the following and delete the rest Optional Lab (EP) <table border="1"> <thead> <tr> <th>K</th><th>E1</th><th>E2</th><th>E3</th><th>E4</th><th>E5</th><th>E6</th></tr> </thead> <tbody> <tr> <td>A-B</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </tbody> </table> Fill the table as in the curriculum: Track (A-Computer Science, B- Computer Engineering) / Specialization Compulsory (Y) / Core Specialization (B)/ Elective Specialization (E)						K	E1	E2	E3	E4	E5	E6	A-B						
K	E1	E2	E3	E4	E5	E6														
A-B																				
URL	https://eclass.uoa.gr/courses/DI375																			
EXPECTED PRIOR KNOWLEDGE/ PREREQUISITES AND PREPARATION:																				
TEACHING AND EXAMINATIONS LANGUAGE:	GREEK																			
THE COURSE IS OFFERED TO ERASMUS STUDENTS	NO																			

COURSE CONTENT
This course is about digital circuits design and implementation using Field Programmable Gate Arrays (FPGAs) technologies using CAD tools from Xilinx (Vivado Design Suite WebPACK edition). In details, the course is about digital circuits design using the VHDL hardware description language, under specific timing and I/O constraints, synthesis, implementation and bitstream generation targeting specific FPGA target technology, as well as, verification at all levels of development (VHDL source code, post synthesis, post place & route) using simulation, debug and FPGA validation using a proper FPGA development board. The digital circuits to be designed and implemented are of similar academic importance and complexity to those taught in the undergraduate course of Logic Design (K02).

The development board that will be used in the training process is the Xilinx Zedboard hosting a Xilinx Zynq 7000 series FPGA.

The course includes the following sections:

1. Digital system implementation technologies - Introduction to Xilinx FPGA technology
2. Methodology and FPGA development flow
3. Downloading, licensing and installation of Xilinx FPGA development tools. Introduction to development board (Zedboard)
4. Basic concepts of modeling with VHDL
5. Basic verification using VHDL testbenches
6. Basic combinational circuits (decoders, encoders, multiplexers, etc.) with VHDL
7. Basic arithmetic operations (addition, subtractions, comparisons, multiplications, etc.) with VHDL
8. Basic state elements (latches, flip-flops, registers, shift registers) with VHDL
9. Counters with VHDL
10. Memories with VHDL
11. Finite State Machines with VHDL
12. Timing constraints and design for timing closure
13. Design using Xilinx IP cores

STUDENT LEARNING OBJECTIVES

Teaching-Learning Goals-Expected Learning Outcomes

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

- Design and implement digital circuits using VHDL hardware description language
- Design and implement digital circuits targeting FPGA technologies using Xilinx software tools
- Understand the synthesis, verification and implementation processes targeting FPGAs

TEACHING AND LEARNING METHODS - ASSESSMENT

TEACHING METHOD	In the classroom using PowerPoint slide presentations for the theoretical part of the course (VHDL hardware description language). In the laboratory for the design and implementation of circuits on the FPGA development board.										
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	Learning process supported by the e-class platform (Hardware delivery, Announcements) Email communication Utilization of Specialized Software										
TEACHING ORGANIZATION <i>Describe in detail the way and methods of teaching:</i> Enhanced Lectures, Online Lectures, Seminars, Tutorial, Laboratory, Laboratory Exercise, Study & analysis of literature, Practice (Positioning), Interactive teaching,	<table border="1"> <thead> <tr> <th>Activity</th><th>Student Workload (hours)</th></tr> </thead> <tbody> <tr> <td>Lectures</td><td>12</td></tr> <tr> <td>Laboratory</td><td>14</td></tr> <tr> <td>Independent Study</td><td>26</td></tr> <tr> <td>Total Course</td><td>52</td></tr> </tbody> </table>	Activity	Student Workload (hours)	Lectures	12	Laboratory	14	Independent Study	26	Total Course	52
Activity	Student Workload (hours)										
Lectures	12										
Laboratory	14										
Independent Study	26										
Total Course	52										

Developing a project, Individual / group work Telework (reference to tools) etc. Details of the student's study hours for each learning activity and hours of non-guided study are shown to ensure that the total workload at the semester corresponds to the ECTS							
ASSESSMENT OF STUDENTS Description of the assessment process Assessment Methods, Formative or Concluding, Multiple Choice Test, Quick Response Questions, Test Development Questions, Problem Solving, Written Work, Report / Report, Oral Examination, Public Presentation, Laboratory Work, Other / Other Fully defined evaluation criteria are mentioned and if and where they are accessible to students.	Describe explicitly methods, evaluation tools and provided feedback. The table below is supplemented accordingly. <table><tr><th>Assessment methods</th><th>Number</th><th>Percentage</th></tr><tr><td>Laboratory examination</td><td>1</td><td>100%</td></tr></table>	Assessment methods	Number	Percentage	Laboratory examination	1	100%
Assessment methods	Number	Percentage					
Laboratory examination	1	100%					

LITERATURE AND STUDY MATERIALS / READING LIST
1) Digital Design (VHDL): An Embedded Systems Approach Using VHDL, Peter J. Ashenden, (In Greek by M.Psarakis, N. Kranitis and D. Gizopoulos), 1st Edition, 2010, New Technologies Publications 2) Circuit Design with VHDL, V.A. Pedroni, 1st Edition, 2008, Kleidarithmos Publications

INSTITUTION	NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS					
SCHOOL	SCHOOL OF SCIENCE					
DEPARTMENT	INFORMATICS AND TELECOMMUNICATIONS					
COURSE LEVEL	UNDERGRADUATE					
COURSE TITLE	Circuits and Systems Laboratory					
COURSE CODE	K11ε	Semester	3	ECTS	2	
TEACHING HOURS per week	THEORY		SEMINAR.		LABORATORY	2
COURSE TYPE	Optional Lab (EP)					
	K	E1	E2	E3	E4	E5
<i>Fill the table as in the curriculum: Track (A-Computer Science, B- Computer Engineering) / Specialization Compulsory (Y) / Core Specialization (B)/ Elective Specialization (E)</i>						
URL	https://eclass.uoa.gr/courses/DI320/					
EXPECTED PRIOR KNOWLEDGE/ PREREQUISITES AND PREPARATION:						
TEACHING AND EXAMINATIONS LANGUAGE:	GREEK					
THE COURSE IS OFFERED TO ERASMUS STUDENTS	NO					

COURSE CONTENT
Circuit theory is covered with an emphasis on the analysis and the solving of exercises for both DC and AC for their permanent and transient states. The Circuit and Systems Laboratory is also presented, as well as its instruments, equipment and measurement methodology. Emphasis is given to the practical training in the construction and analysis of actual circuits and to obtaining correct measurements of electrical quantities. In particular, the following topics are included: 1. Basic circuits elements: active and passive elements (resistance, capacitor, inductor, operational amplifier, polarity conventions, earthing), current-voltage plots (Ohm's law), signals (DC, AC, power, rms values analog, digital). 2. Linear Networks: basic laws and rules for circuit analysis (nodes, branches, loops, elements connected in series and parallel, Kirchhoff rules, voltage and current dividers, superposition principle, Thevenin and Norton theorems, duality, real voltage and current sources. maximum power transfer). 3. Circuits with energy storage elements: RC-RL (transient response, frequency response, impedance, low or high frequency pass filters, resonant circuits).

4. Operational Amplifiers (OpAmp): internal circuits and applications of OpAmps, ideal and real OpAmps (Texas Instruments LM741), basic OpAmp circuits (inverted amplifier, non-inverted amplifier, voltage follower, adder, differential amplifier, integrator, differentiator).
5. Methodology for selecting electrical elements and circuit connections: real passive and active elements, signal generators, breadboards, wiring, earthing.
6. Measurement methodology: laboratory instruments and principles of operation (multimeters, oscilloscopes), voltage, current, resistance, phase difference measurements, display of time-varying signals, graphs of measured quantities, calibration.

STUDENT LEARNING OBJECTIVES

Teaching and Learning Objectives

The objective of the course is to familiarize students with the Circuits and Systems Laboratory and especially its scientific instruments and basic circuit components: passive circuit components (resistors, inductors, capacitors), active components (OpAmps), breadboards, cables, earthing, multimeters, oscilloscopes, sources. Understanding the behavior of these basic electronic components leads to the prototyping, analysis, understanding and maintenance of electronic systems.

Expected Learning Outcomes

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

- Define electrical current, current density, voltage and basic SI units.
- Identify the basic circuit components (conductor, resistor, capacitor, inductor, OpAmp, source, variable resistor), detect their electrical quantities, construct their i-v plots, identify their physical shapes and their physical limits.
- Locate the basic elements of linear circuits (node, branch, loop, short circuit, open circuit).
- Redesign resistor networks to facilitate the calculation of equivalent resistance between two nodes and apply Ohm's law, voltage and current divider rules, sign and Kirchhoff rules, to simple electrical circuits for their analysis.
- Apply the superposition principle, the Thevenin and Norton equivalents, and the maximum power transfer theorem for calculating the electrical quantities of each circuit component (load, current, voltage, magnetic flux, power, stored energy) for DC circuits.
- Construct differential equations for circuits comprising inductors and capacitors.
- Calculate the instantaneous, mean and rms values of any periodic waveform and explain the physical significance of these values for power.
- Convert sinusoidal voltages and currents to phasors and vice versa, and design equivalent AC circuit representations and apply DC circuit analysis methods to AC circuits using phasors.
- Explain the fundamental properties of transient responses, and determine the DC steady state and the complete solution of first order circuits containing inductors and capacitors.
- Explain the physical importance of the analysis in the frequency domain and calculate the frequency and phase response for periodic signals,
- Recognize and assemble simple first-order passive electrical filters and explain their responses and properties.
- Explain the properties of OpAmps and the concepts of gain and input and output impedance, and detect the differences between open loop and closed loop circuits.
- Recognize the circuit diagram and calculate the gain of the simple inverting and non-inverting amplifier, adder and differential amplifier.
- Design circuits on paper, construct the corresponding actual circuits in the laboratory, test them and convert them in both forms (diagram and real circuit).

- Explain the effect of internal resistance on real voltage and current sources and on voltage and current measuring devices.
- Handle and adjust the Circuits and Systems Laboratory equipment and instruments and their external connections (cables, educational boards, breadboards, multimeters, oscilloscopes, signal generators).
- Correctly measure actual circuits' electrical quantities with the actual measuring instruments of the laboratory.
- Record, plot and compare measurement results, and calibrate plots of measurements in linear and semi-logarithmic axes.

TEACHING AND LEARNING METHODS - ASSESSMENT	
TEACHING METHOD	In Class and in Laboratory (Face to Face)
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	Support for the learning process through the eClass platform and in particular the modules: course description, distribution of educational material, announcements, messages, lecture and lab calendar, evaluation feedback, comments, user groups. E-mail communication. Circuit and System Laboratory is equipped with wiring harnesses, circuit boards, breadboards, complete collections of passive elements of various sizes and types (resistors, capacitors, coils), active element collections (OpAmps), DC and AC generators, digital multimeters, oscilloscopes.
TEACHING ORGANIZATION <i>Describe in detail the way and methods of teaching:</i> <i>Enhanced Lectures,</i> <i>Online Lectures,</i> <i>Seminars,</i> <i>Tutorial,</i> <i>Laboratory,</i> <i>Laboratory Exercise,</i> <i>Study & analysis of literature,</i> <i>Practice (Positioning),</i> <i>Interactive teaching,</i> <i>Developing a project,</i> <i>Individual / group work</i> <i>Telework (reference to tools) etc.</i>	Class lectures take place in a classroom using slides and videos, and teaching techniques for activating students and highlighting their experiences such as questions / responses and discussion. Slides and more comprehensive lecture notes are distributed to students in electronic format (the notes booklet is also available to all and in printed form). Laboratory activities take place at the Circuits and Systems Laboratory, where students practice through exercises, in order to familiarize with the equipment, regulate it, complete circuits using circuit boards, create new circuits in breadboards, test their connections and take measurements through the measuring instruments. For each laboratory exercise they are given special forms, which include the statements of their exercises, while on the same forms they complete their measurements, answer questions, perform calculations, draw the graphs of their measurements, record their calculations, and deliver them to the instructor, each time before leaving the lab room. Students in the laboratory are divided into groups of three, and cooperation between the members of each group is allowed. The lab has multiple workstations (10), whereupon 30 students are trained under the close supervision of the teachers and with the help of laboratory assistants. At each lab day, information on safety, handling and wiring rules are first given orally, in order to avoid damage to laboratory equipment (the electrical features of the equipment and the electrical installation prevent personal injury from electric shock).

	During the laboratory exercises the progress and correctness of the wiring is continuously monitored and the voltage / current sources are activated, each time, only after thorough control of each circuit by the laboratory staff. When necessary, corrections and changes of connections are made on the spot and are explained to the student (s). Finally, students are asked to study the corresponding slides, notes, laboratory exercise forms, and laboratory equipment manuals before each laboratory exercise.														
	<table><tr><th>Activity</th><th>Student Workload (hours)</th></tr><tr><td>Lectures</td><td>10</td></tr><tr><td>Laboratory (briefing, practice, exercise completion, form submission)</td><td>10</td></tr><tr><td>Study of relevant literature prior to each laboratory</td><td>10</td></tr><tr><td>Preparation for the exams</td><td>20</td></tr><tr><td>Total Course</td><td>50</td></tr></table>			Activity	Student Workload (hours)	Lectures	10	Laboratory (briefing, practice, exercise completion, form submission)	10	Study of relevant literature prior to each laboratory	10	Preparation for the exams	20	Total Course	50
Activity	Student Workload (hours)														
Lectures	10														
Laboratory (briefing, practice, exercise completion, form submission)	10														
Study of relevant literature prior to each laboratory	10														
Preparation for the exams	20														
Total Course	50														
ASSESSMENT OF STUDENTS <i>Description of the assessment process</i> <i>Assessment Methods, Formative or Concluding, Multiple Choice Test, Quick Response Questions, Test Development Questions, Problem Solving, Written Work, Report / Report, Oral Examination, Public Presentation, Laboratory Work, Other / Other</i> <i>Fully defined evaluation criteria are mentioned and if and where they are accessible to students.</i>	The course involves a formative assessment of the lab's activities combined with final written examinations. During laboratory activities, open notes are allowed. Laboratory activities forms (separate for a total of 5 exercises) are submitted by the student (s) at the end of each exercise. These lab forms, supplemented by measurements, calculations, answers to short answer questions, and student graphs are individual and are rated as technical reports of laboratory exercises. This score is being fed back to the students through eClass during the semester. The average grade of the worksheets, on a scale of integers with a maximum of 10, contributes 50% to the final grade. In addition, the course includes final written examinations with closed notes. Students are required to solve circuit analysis exercises (on paper, outside the lab) and are rated for problem solving (problem analysis, solution justification, presentation and result). The total grade of final written examinations, on a scale of integers with a maximum of 10, contributes 50% to the final grade.														
	<table><tr><th>Assessment methods</th><th>Number</th><th>Percentage</th></tr><tr><td>Written examination</td><td>1</td><td>50%</td></tr><tr><td>Laboratory activities (lab forms)</td><td>5</td><td>50%</td></tr></table>			Assessment methods	Number	Percentage	Written examination	1	50%	Laboratory activities (lab forms)	5	50%			
	Assessment methods	Number	Percentage												
	Written examination	1	50%												
	Laboratory activities (lab forms)	5	50%												

LITERATURE AND STUDY MATERIALS / READING LIST

Suggested textbooks:

1. Rizzoni, G., Kearns, J., and Christides, C. V. (2018). Circuit Theory and Basic Electronics (in Greek). Papazisis Publications, ISBN 9789600234053.
2. Loutrides, S. (2018). Electric Circuits – Analysis Applications with MATLAB and SPICE (in Greek). Tziola Publications, ISBN 9789604185856.

3. Tsivides, G. (2018). Introductory Laboratory of Circuits and Electronics (in Greek). Papasotiriou Publications, ISBN 9789604911219.

Additional bibliography

1. Arapogianni, A. (2014). Circuits and Systems Laboratory. NKUA, Department of Informatics and Telecommunications..

INSTITUTION	NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS																			
SCHOOL	SCHOOL OF SCIENCE																			
DEPARTMENT	INFORMATICS AND TELECOMMUNICATIONS																			
COURSE LEVEL	UNDERGRADUATE																			
COURSE TITLE	Communications Network I Lab																			
COURSE CODE	K16ε	Semester	4 - 5	ECTS	2															
TEACHING HOURS per week	THEORY		SEMINAR.		LABORATORY	2														
COURSE TYPE	Select one of the following and delete the rest Optional Lab (EP) <table border="1"> <thead> <tr> <th>K</th><th>E1</th><th>E2</th><th>E3</th><th>E4</th><th>E5</th><th>E6</th></tr> </thead> <tbody> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </tbody> </table>						K	E1	E2	E3	E4	E5	E6							
K	E1	E2	E3	E4	E5	E6														
URL	https://eclass.uoa.gr/courses/DI349/																			
EXPECTED PRIOR KNOWLEDGE/ PREREQUISITES AND PREPARATION:	None																			
TEACHING AND EXAMINATIONS LANGUAGE:	GREEK																			
THE COURSE IS OFFERED TO ERASMUS STUDENTS	NO																			

COURSE CONTENT
TCP/IP layer protocols are examined as: Ethernet cable construction – Organization, setup and connectivity check of local area networks – Use of Wireshark (packet sniffer) to capture traffic – Remote access to PC – ARP protocol – IP, MAC addresses – Using ping, netstat commands – Static routing – Setting up a router – Routing tables – RIP, OSPF routing protocols – TCP, UDP, DHCP, NAT.

STUDENT LEARNING OBJECTIVES
Expected Learning Outcomes Upon successful completion of the course the student will be able to:

- Discover and examine the operation and the efficiency of the protocols of Link layer, Network layer and Transport layer
- Calculate and specify the required parameters to set up a local area network or efficiently use the examined protocols
- Construct Ethernet cables
- Design and calculate subnets within an IP address range
- Use packet sniffing tools in order to understand the functionality of the examined protocols

TEACHING AND LEARNING METHODS - ASSESSMENT											
TEACHING METHOD	In the LAB (face to face, using the real hardware/software of infrastructure)										
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	Support through e-class. Specifically: Description, Material, Announcements, Callendar, Links, Conversation Communication through email										
TEACHING ORGANIZATION	Describe in detail the way and methods of teaching: Enhanced Lectures, Online Lectures, Seminars, Tutorial, Laboratory, Laboratory Exercise, Study & analysis of literature, Practice (Positioning), Interactive teaching, Developing a project, Individual / group work Telework (reference to tools) etc. Details of the student's study hours for each learning activity and hours of non-guided study are shown to ensure that the total workload at the semester corresponds to the ECTS <table><tr><td>Labs in real networking environment (no simulation). Support through e-class.</td></tr><tr><th>Activity</th><th>Student Workload (hours)</th></tr><tr><td>Lectures</td><td>30</td></tr><tr><td>Independent Study</td><td>20</td></tr><tr><td>Total Course (25 hours of workload per unit of credit)</td><td>50</td></tr></table>		Labs in real networking environment (no simulation). Support through e-class.	Activity	Student Workload (hours)	Lectures	30	Independent Study	20	Total Course (25 hours of workload per unit of credit)	50
Labs in real networking environment (no simulation). Support through e-class.											
Activity	Student Workload (hours)										
Lectures	30										
Independent Study	20										
Total Course (25 hours of workload per unit of credit)	50										
ASSESSMENT OF STUDENTS	Description of the assessment process Assessment Methods, Formative or Concluding, Multiple Choice Test, Quick Response Questions, Test Development Questions, Problem Solving, Written Work, Report / Report, Oral Examination, Public Presentation, Laboratory Work, Other / Other Fully defined evaluation criteria are mentioned and if and where they are accessible to students. Students go through written examinations that describe lab configurations. Assessment is discussed with students if asked. <table><tr><th>Assessment methods</th><th>Number</th><th>Percentage</th></tr><tr><td>Written examination</td><td>1</td><td>100%</td></tr></table>		Assessment methods	Number	Percentage	Written examination	1	100%			
Assessment methods	Number	Percentage									
Written examination	1	100%									

LITERATURE AND STUDY MATERIALS / READING LIST

Communication Networks I Lab – Notes (written/edited by Athanasios Vaios, printed by University of Athens).
Support material uploaded in e-class.

C. TRACK COMPULSORY COURSES (EYM)

INSTITUTION	NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS																			
SCHOOL	SCHOOL OF SCIENCE																			
DEPARTMENT	INFORMATICS AND TELECOMMUNICATIONS																			
COURSE LEVEL	UNDERGRADUATE																			
COURSE TITLE	Numerical Analysis																			
COURSE CODE	K15	Semester	5	ECTS	6															
TEACHING HOURS per week	THEORY	3	SEMINAR.	1	LABORATORY	1														
COURSE TYPE	Select one of the following and delete the rest Track Compulsory (EYM) <table border="1"> <tr> <td>K</td><td>E1</td><td>E2</td><td>E3</td><td>E4</td><td>E5</td><td>E6</td></tr> <tr> <td>A</td><td>Y</td><td></td><td></td><td></td><td></td><td>E</td></tr> </table>						K	E1	E2	E3	E4	E5	E6	A	Y					E
K	E1	E2	E3	E4	E5	E6														
A	Y					E														
URL	https://eclass.uoa.gr/courses/D16/																			
EXPECTED PRIOR KNOWLEDGE/ PREREQUISITES AND PREPARATION:	Recommended compulsory courses K01 Calculus I and K03 Linear Algebra.																			
TEACHING AND EXAMINATIONSLANGUAGE:	GREEK																			
THE COURSE IS OFFERED TO ERASMUS STUDENTS	NO																			

COURSE CONTENT
The course subject is the design and analysis of numerical algorithms for the solution of scientific problems. In particular, the course covers the core of Numerical Linear Algebra and the Approximation Theory. It begins with an elementary introduction to error analysis. Then it presents the numerical solution of nonlinear equations. After the presentation of the methods of Bisection and Regula Falsi it analyses the theory of the fixed point method and the Newton method. Particular emphasis is given on the numerical solution of linear systems with direct and iterative methods. The methods of Gaussian Elimination and the Gauss Jordan methods are presented with their corresponding algorithms and complexity as well as the iterative methods of Jacobi, Gauss-Seidel and Successive Overrelaxation (SOR) with their corresponding extrapolated versions (JOR, EGS and ESOR). Simplex is presented as an application of the Gauss-Jordan method. The next subject refers to the power method with its different versions for the computation of the eigenvalue with the maximum/minimum modulus and its corresponding eigenvector of a square matrix. Next, the problem of approximating a function with the method of interpolation is presented. The methods of Langrange and

Newton are presented and analysed as well as the iterative methods of Aitken and Neville. Then the Least Square problem is presented with its extension by the use of orthogonal polynomials. Numerical differentiation based on interpolation is the next subject where different formulae are presented with their corresponding errors. At this point we simply refer to the undetermined coefficient method and use it as an alternative to find formulae of numerical differentiation. A similar pattern is followed for the Numerical Integration. The interpolation polynomial is used to find different numerical integration formulae like Trapezoidal and Simpson as well as their corresponding errors. At this point the method of undetermined coefficient is presented in detail as an alternative for the determination of numerical integration formulae and their corresponding errors. The section ends with the presentation of the methods of Romberg and Gauss. Next, the problem of numerical solution of ordinary differential equations is analyzed. For the initial value problem the Euler and Taylor methods are presented and the local and round off errors are found. The course ends with the presentation of the numerical solution of the boundary problem involving a second degree ordinary differential equation. There is a laboratory for the use of MatLab for the implementation of the numerical algorithms of the course. Also, there are four sets of theoretical home works.

STUDENT LEARNING OBJECTIVES

Teaching-Learning Goals-Expected Learning Outcomes

Introduces students to basic numerical algorithm design techniques. Provides students with tools for evaluating the performance of the numerical algorithms and choosing the most appropriate algorithm to solve a scientific problem.

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

- Develop and implement numerical algorithms for the solution of scientific problems
- Evaluate and compare the efficiency of the numerical algorithms
- Design and implement scientific software for the simulation of physical phenomena
- Implement numerical algorithms in MatLab

TEACHING AND LEARNING METHODS – ASSESSMENT

TEACHING METHOD	In Class (Face to Face)
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	Learning process supported by the e-class platform. In particular, slide presentation of course and laboratory lectures, Discussions, Announcements, Task assignments and submissions, Student groups, Laboratory assignments, External Links of electronic books, notes, chapters, lectures, international Laboratories and Job announcements. Email communication Live transmission of lectures Ability to track recorded lectures http://opencourses.uoa.gr/courses/DI12/ Utilization of MatLab.

TEACHING ORGANIZATION Describe in detail the way and methods of teaching: Enhanced Lectures, Online Lectures, Seminars, Tutorial, Laboratory, Laboratory Exercise, Study & analysis of literature, Practice (Positioning), Interactive teaching, Developing a project, Individual / group work Telework (reference to tools)etc. Details of the student's study hours for each learning activity and hours of non-guided study are shown to ensure that the total workload at the semester corresponds to the ECTS	The lectures and the tutorials are mainly presented by slides. Occasionally use of blackboard. The MatLab is presented by slides at the Laboratory. Students are required to implement numerical algorithms in MatLab during the laboratory session. Also, students have to submit four sets of home works. <table><tr><th>Activity</th><th>Student Workload (hours)</th></tr><tr><td>Lectures</td><td>39</td></tr><tr><td>Tutorial</td><td>13</td></tr><tr><td>Laboratory</td><td>13</td></tr><tr><td>Study MatLab Laboratory</td><td>20</td></tr><tr><td>Individual Assignments</td><td>20</td></tr><tr><td>Independent Study</td><td>30</td></tr><tr><td>Study for the final exam</td><td>15</td></tr><tr><td>Total Course (25 hours of workload per unit of credit)</td><td>150</td></tr></table>	Activity	Student Workload (hours)	Lectures	39	Tutorial	13	Laboratory	13	Study MatLab Laboratory	20	Individual Assignments	20	Independent Study	30	Study for the final exam	15	Total Course (25 hours of workload per unit of credit)	150
Activity	Student Workload (hours)																		
Lectures	39																		
Tutorial	13																		
Laboratory	13																		
Study MatLab Laboratory	20																		
Individual Assignments	20																		
Independent Study	30																		
Study for the final exam	15																		
Total Course (25 hours of workload per unit of credit)	150																		
ASSESSMENT OF STUDENTS Description of the assessment process Assessment Methods, Formative or Concluding, Multiple Choice Test, Quick Response Questions, Test Development Questions, Problem Solving, Written Work, Report / Report, Oral Examination, Public Presentation, Laboratory Work, Other / Other Fully defined evaluation criteria are mentioned and if and where they are accessible to students.	Students have to pass two written exams, one midterm and one final. Both exams are of multiple choice type. Also they have to submit 4 sets of home works and 6 laboratory exercises. <table><tr><th>Assessment methods</th><th>Number</th><th>Percentage</th></tr><tr><td>Written examination</td><td>1</td><td>50%</td></tr><tr><td>Progress</td><td>1</td><td>20%</td></tr><tr><td>Assignments</td><td>4</td><td>15%</td></tr><tr><td>Laboratory</td><td>6</td><td>15%</td></tr><tr><td></td><td></td><td></td></tr></table>	Assessment methods	Number	Percentage	Written examination	1	50%	Progress	1	20%	Assignments	4	15%	Laboratory	6	15%			
Assessment methods	Number	Percentage																	
Written examination	1	50%																	
Progress	1	20%																	
Assignments	4	15%																	
Laboratory	6	15%																	

LITERATURE AND STUDY MATERIALS / READING LIST
N. Missirlis, Numerical Analysis : An algorithmic approach, Publication by National and Kapodistrian University of Athens, 2017. https://service.eudoxus.gr/search/#s/%CE%91%CF%81%CE%B9%CE%B8%CE%BC%CE%B7%CF%84%CE%B9%CE%BA%CE%AE%20%CE%91%CE%BD%CE%AC%CE%BB%CF%85%CF%83%CE%B7/O Notes and slides for the MatLab.

INSTITUTION	NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS																			
SCHOOL	SCHOOL OF SCIENCE																			
DEPARTMENT	INFORMATICS AND TELECOMMUNICATIONS																			
COURSE LEVEL	UNDERGRADUATE																			
COURSE TITLE	Computer Architecture II																			
COURSE CODE	K30	Semester	5	ECTS	6															
TEACHING HOURS per week	THEORY	3	SEMINAR.	1	LABORATORY	1														
COURSE TYPE	Select one of the following and delete the rest Compulsory (YM) <table border="1"> <thead> <tr> <th>K</th><th>E1</th><th>E2</th><th>E3</th><th>E4</th><th>E5</th><th>E6</th></tr> </thead> <tbody> <tr> <td>B</td><td></td><td></td><td>B</td><td>Y</td><td></td><td></td></tr> </tbody> </table> <i>Fill the table as in the curriculum: Track (A-Computer Science, B- Computer Engineering) / Specialization Compulsory (Y) / Core Specialization (B)/ Elective Specialization (E)</i>						K	E1	E2	E3	E4	E5	E6	B			B	Y		
K	E1	E2	E3	E4	E5	E6														
B			B	Y																
URL	https://eclass.uoa.gr/courses/D52/																			
EXPECTED PRIOR KNOWLEDGE/ PREREQUISITES AND PREPARATION:	K14 Computer Architecture I																			
TEACHING AND EXAMINATIONS LANGUAGE:	GREEK																			
THE COURSE IS OFFERED TO ERASMUS STUDENTS	NO																			

COURSE CONTENT
ISA of RISC architectures (review) Basics of pipelining, Pipelining in MIPS microprocessors. Datapath and control unit design for pipelined CPU. Data, control and structural hazards. Superscalar and out-of-order basics. Branch prediction. Cache memories concept. Caches architectures and algorithms.

Virtual memory.
Input/output devices.
Storage devices performance and reliability.
Microprocessor systems interfacing.

STUDENT LEARNING OBJECTIVES

Teaching-Learning Goals-Expected Learning Outcomes

Introduction to advanced computer architecture topics including pipelining, caches and input/output and storage devices.

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

- Mention advanced techniques for performance improvement
- Describe the concept and implementation details of pipelining
- Use architectural simulators for pipelining
- Explain the basics and the implementation of caches
- Implement hardware and software techniques for caches performance improvement
- Use architectural simulators for caches

TEACHING AND LEARNING METHODS - ASSESSMENT

TEACHING METHOD	In Class with slides and whiteboard for examples and exercises of the course. In the PCs Lab using educational architectural simulators.	
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	Electronic platform e-class (all tools employed: announcements, documents, assignments, groups of users, etc.) Email communication Live broadcasting of lectures Recording of lectures for offline study	
TEACHING ORGANIZATION Describe in detail the way and methods of teaching: Enhanced Lectures, Online Lectures, Seminars, Tutorial, Laboratory, Laboratory Exercise, Study & analysis of literature, Practice (Positioning), Interactive teaching, Developing a project, Individual / group work Telework (reference to tools) etc.	Activity	Student Workload (hours)
	Lectures	39
	Tutorial	13
	Laboratory	13
	Lab preparation	11
	Graded assignments	35
	Independent Study	39
	Total Course (25 hours of workload per unit of credit)	150

<i>Details of the student's study hours for each learning activity and hours of non-guided study are shown to ensure that the total workload at the semester corresponds to the ECTS</i>																
ASSESSMENT OF STUDENTS <i>Description of the assessment process</i> <i>Assessment Methods, Formative or Concluding, Multiple Choice Test, Quick Response Questions, Test Development Questions, Problem Solving, Written Work, Report / Report, Oral Examination, Public Presentation, Laboratory Work, Other / Other</i> <i>Fully defined evaluation criteria are mentioned and if and where they are accessible to students.</i>	Describe explicitly methods, evaluation tools and provided feedback. The table below is supplemented accordingly. <table><tr><th>Assessment methods</th><th>Number</th><th>Percentage</th></tr><tr><td>Written examination</td><td>1</td><td>60%</td></tr><tr><td></td><td></td><td></td></tr><tr><td>Assignments (on simulators)</td><td>2</td><td>40% (20% each)</td></tr><tr><td></td><td></td><td></td></tr></table>	Assessment methods	Number	Percentage	Written examination	1	60%				Assignments (on simulators)	2	40% (20% each)			
Assessment methods	Number	Percentage														
Written examination	1	60%														
Assignments (on simulators)	2	40% (20% each)														

LITERATURE AND STUDY MATERIALS / READING LIST
"Computer Organization and Design: the Hardware/Software Interface", 4th Edition, D.A.Patterson, J.L.Hennessy, Elsevier/Morgan Kaufmann, 2010.

INSTITUTION	NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS						
SCHOOL	SCHOOL OF SCIENCE						
DEPARTMENT	INFORMATICS AND TELECOMMUNICATIONS						
COURSE LEVEL	UNDERGRADUATE						
COURSE TITLE	Communication Networks II						
COURSE CODE	K33	Semester	5	ECTS	6		
TEACHING HOURS per week	THEORY	3	SEMINAR.	1	LABORATORY	1	
COURSE TYPE	Electives (ΠΜ)						
	K	E1	E2	E3	E4	E5	E6
	B					Y	
URL	https://eclass.uoa.gr/courses/DI378/						
EXPECTED PRIOR KNOWLEDGE/ PREREQUISITES AND PREPARATION:	Knowledge of basic principles and technologies of packet switched networks and the Internet at the link, network and transport layers. Basic knowledge of applied probabilities. Prerequisite courses: a first course on Communication Networks I (K16).						
TEACHING AND EXAMINATIONS LANGUAGE:	GREEK						
THE COURSE IS OFFERED TO ERASMUS STUDENTS	NO						

COURSE CONTENT
The course aims to cover at the undergraduate level the following thematic units: • Queuing Delay in Packet Switched Networks • Wireless/Mobile Networks (Wireless LANs, mobility support for the Internet, new generation mobile networks) • Networking and Multimedia Applications • Network Security

STUDENT LEARNING OBJECTIVES
Teaching-Learning Goals-Expected Learning Outcomes The aim of the course is to provide students with a deeper understanding of the factors that affect latency in packet switched networks, design principles and architectures of wireless / mobile networks, network architectures, and quality of service support mechanisms in multimedia transmission, as well as the techniques that ensure confidentiality, authentication and integrity of communication and ways of protecting networks from malicious attacks.

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

- Explain the factors affecting the queuing delay in packet switched networks. More specifically, a) describe the factors that affect the waiting time of packets in Internet routers, b) use simple queuing models to quantitate queue size and delay, c) describe and explain how the delay of a packet differs depending on the flow priority it belongs to; d) recognize why the analysis of a network of interconnected queues is difficult; and e) to apply useful approximations for analyzing the delay and for network dimensioning.
- Describe and explain why the characteristics of wireless links and user mobility make it difficult to provide service quality in today's Internet. Describe and illustrate the basic architecture and protocols of wireless local area networks (IEEE 802.11). Apply the principles of planning Internet access through cellular systems, user mobility management, routing to mobile users and mobile IP.
- Describe and explain multimedia design choices and networking support mechanisms that can best exploit a "best effort" network such as the Internet. Separate, categorize and explain the basic approaches to expanding the Internet architecture to meet multimedia service quality requirements.
- Explain, select and apply techniques that enable encryption / decryption of communications, authentication of the communicating parties and message integrity, as well as use and implement ways to protect against malicious attacks.

TEACHING AND LEARNING METHODS - ASSESSMENT															
TEACHING METHOD	In Class (Face to Face)														
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	Learning process supported by the e-class platform for accessing the course's digital educational content (Power Point Presentations, Recorded Videolectures, Interactive Elements, Self-Assessment Exercises, References) and announcements. Email communication Live streaming of lectures On demand access of recorded lectures (https://delos.uoa.gr/opendelos/search?crs=78e30551).														
TEACHING ORGANIZATION <i>Describe in detail the way and methods of teaching:</i> Enhanced Lectures, Online Lectures, Seminars, Tutorial, Laboratory, Laboratory Exercise, Study & analysis of literature, Practice (Positioning), Interactive teaching, Developing a project, Individual / group work Telework (reference to tools) etc. <i>Details of the student's study hours for each learning activity and hours of non-guided study are shown to ensure that the total workload at the semester corresponds to the ECTS</i>	Theory is presented using slide projection. During the tutorial sessions, problems are discussed and exercises are presented / solved in an interactive way. The lectures are broadcast via live streaming and are recorded, so that students can view them on demand. Four (4) laboratory sessions, lasting 2 hours and 15 minutes each, are offered. <table> <tr> <th>Activity</th><th>Student Workload (hours)</th></tr> <tr> <td>Lectures</td><td>39</td></tr> <tr> <td>Tutorial</td><td>13</td></tr> <tr> <td>Laboratory</td><td>13</td></tr> <tr> <td>Preparation for the Laboratory</td><td>25</td></tr> <tr> <td>Independent Study</td><td>60</td></tr> <tr> <td>Total Course</td><td>150</td></tr> </table>	Activity	Student Workload (hours)	Lectures	39	Tutorial	13	Laboratory	13	Preparation for the Laboratory	25	Independent Study	60	Total Course	150
Activity	Student Workload (hours)														
Lectures	39														
Tutorial	13														
Laboratory	13														
Preparation for the Laboratory	25														
Independent Study	60														
Total Course	150														

	(25 hours of workload per unit of credit)										
ASSESSMENT OF STUDENTS <i>Description of the assessment process</i> <i>Assessment Methods, Formative or Concluding, Multiple Choice Test, Quick Response Questions, Test Development Questions, Problem Solving, Written Work, Report / Report, Oral Examination, Public Presentation, Laboratory Work, Other / Other</i> <i>Fully defined evaluation criteria are mentioned and if and where they are accessible to students.</i>	Students are assessed by written examination and the reporting of laboratory exercises. The written examination covers the theoretical part, and counts for 60% of the final grade. In the laboratory part, 4 laboratory exercises are delivered. The grade of the laboratory exercises counts for 40% of the final grade. <table> <tr> <th>Assessment methods</th><th>Number</th><th>Percentage</th></tr> <tr> <td>Written examination</td><td>1</td><td>60%</td></tr> <tr> <td>Laboratory</td><td>4</td><td>40%</td></tr> </table>	Assessment methods	Number	Percentage	Written examination	1	60%	Laboratory	4	40%	
Assessment methods	Number	Percentage									
Written examination	1	60%									
Laboratory	4	40%									

LITERATURE AND STUDY MATERIALS / READING LIST
Main text - Computer Networking, J. Kurose και K. Ross:, Pearson/Addison-Wesley, 7th Edition (In Greek), Giourdas Publishing Additional reading - Computer Networks, A.Tanenbaum and D.Wetherall, Kleidarithmos Publishing - Computer Networks, L.Peterson and B.Davie, Kleidarithmos Publishing

INSTITUTION	NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS																			
SCHOOL	SCHOOL OF SCIENCE																			
DEPARTMENT	INFORMATICS AND TELECOMMUNICATIONS																			
COURSE LEVEL	UNDERGRADUATE																			
COURSE TITLE	Mathematics for Computer Science																			
COURSE CODE	K20α	Semester	6	ECTS	6															
TEACHING HOURS per week	THEORY	4	SEMINAR.	1	LABORATORY															
COURSE TYPE	Select one of the following and delete the rest Track Compulsory (EYM) <table border="1"> <thead> <tr> <th>K</th><th>E1</th><th>E2</th><th>E3</th><th>E4</th><th>E5</th><th>E6</th></tr> </thead> <tbody> <tr> <td>A</td><td>Y</td><td></td><td></td><td></td><td></td><td></td></tr> </tbody> </table> <i>Fill the table as in the curriculum: Track (A-Computer Science, B- Computer Engineering) / Specialization Compulsory (Y) / Core Specialization (B)/ Elective Specialization (E)</i>						K	E1	E2	E3	E4	E5	E6	A	Y					
K	E1	E2	E3	E4	E5	E6														
A	Y																			
URL	https://eclass.uoa.gr/courses/D36/																			
EXPECTED PRIOR KNOWLEDGE/ PREREQUISITES AND PREPARATION:	K09 Discrete Mathematics																			
TEACHING AND EXAMINATIONS LANGUAGE:	GREEK																			
THE COURSE IS OFFERED TO ERASMUS STUDENTS	NO																			

COURSE CONTENT
The course covers basic and advanced techniques in Discrete Mathematics that are necessary for the study and analysis of computer models and systems. Proof methods with an emphasis on induction and existence proofs (Pigeonhold principle, Diagonalization). Applications to Fibonacci Sequences and Number Theory. Elements of Ramsey Theory. Countable and uncountable sets. Graph theory: trees, connectivity, planarity, bipartite matching. Equivalence and partial order relations. Theorems of Sperner and Dilworth. Tools from Probability Theory.

STUDENT LEARNING OBJECTIVES
Teaching-Learning Goals-Expected Learning Outcomes The goal of the class is for the student to acquire math knowledge that is necessary in computer science and acquaint herself further with symbolic thinking.

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

- Distinguish between constructive and non-constructive proofs.
- Accurately define the space of feasible solutions of problems.
- Develop mathematical proofs in a coherent and elegant way.
- Model problem inputs using graphs and their properties.
- Analyze partial order and equivalence relations.
- Express in an accurate and concise manner problem requirements.

TEACHING AND LEARNING METHODS - ASSESSMENT		
TEACHING METHOD	In Class (Face to Face)	
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	Learning process supported by the e-class platform (Teaching material; Announcements; Task assignments; Outside links etc) Email communication. There exists a possibility of lecture transmission.	
TEACHING ORGANIZATION <i>Describe in detail the way and methods of teaching:</i> Enhanced Lectures, Online Lectures, Seminars, Tutorial, Laboratory, Laboratory Exercise, Study & analysis of literature, Practice (Positioning), Interactive teaching, Developing a project, Individual / group work Telework (reference to tools) etc. <i>Details of the student's study hours for each learning activity and hours of non-guided study are shown to ensure that the total workload at the semester corresponds to the ECTS</i>	Activity	Student Workload (hours)
	Lectures	52
	Seminars	13
	Preparation for seminars	15
	Study and analysis of the literature	15
	Preparation for the next lecture	13
	Homework assignments	12
	Independent Study	30
	Total Course (25 hours of workload per unit of credit)	150
	Lectures are supported by transparencies. The board is also used extensively. An emphasis is placed both during the lectures and the seminars on problem solving. Homework assignments are individual or in groups of 2.	

ASSESSMENT OF STUDENTS

Description of the assessment process

Assessment Methods, Formative or Concluding, Multiple Choice Test, Quick Response Questions, Test Development Questions, Problem Solving, Written Work, Report / Report, Oral Examination, Public Presentation, Laboratory Work, Other / Other

Fully defined evaluation criteria are mentioned and if and where they are accessible to students.

Assessment methods	Number	Percentage
Written examination	1	90%
Homeworks	1	10%

Evaluation by written examination and homework assignments. Grade Feedback is available upon request.

LITERATURE AND STUDY MATERIALS / READING LIST

Basic textbook in Greek: Μ. Κολουτζάκης, Χ. Παπαχριστόδουλος. Διακριτά Μαθηματικά, ΣΕΑΒ/Κάλλυπος, 2015. Also the greek translation of C. L. Liu "Discrete Mathematics".

Additionally the students have access to 1) Lecture notes by Emiris and Koutsoupas 2) transparencies by S. Kolliopoulos 3) recommended literature in English (Lazlo Lovasz, Jozsef Pelikan, Katalin Vesztergombi. Discrete Mathematics: elementary and beyond. Springer, 2003. Eric Lehman, Tom Leighton, Albert Meyer. Mathematics for Computer Science, MIT, 2015. Jiri Matousek, Jaroslav Nesetril. Invitation to Discrete Mathematics, 2nd edition. Oxford University Press, 2008.)

INSTITUTION	NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS																			
SCHOOL	SCHOOL OF SCIENCE																			
DEPARTMENT	INFORMATICS AND TELECOMMUNICATIONS																			
COURSE LEVEL	UNDERGRADUATE																			
COURSE TITLE	Theory of Computation																			
COURSE CODE	K25	Semester	6	ECTS	6															
TEACHING HOURS per week	THEORY	3	SEMINAR.	1	LABORATORY															
COURSE TYPE	Select one of the following and delete the rest Track Compulsory (EYM) <table border="1"> <thead> <tr> <th>K</th><th>E1</th><th>E2</th><th>E3</th><th>E4</th><th>E5</th><th>E6</th></tr> </thead> <tbody> <tr> <td>A</td><td></td><td>Y</td><td></td><td></td><td></td><td></td></tr> </tbody> </table> <i>Fill the table as in the curriculum: Track (A-Computer Science, B- Computer Engineering) / Specialization Compulsory (Y) / Core Specialization (B)/ Elective Specialization (E)</i>						K	E1	E2	E3	E4	E5	E6	A		Y				
K	E1	E2	E3	E4	E5	E6														
A		Y																		
URL	https://di.uoa.gr/~prondo/toc.html																			
EXPECTED PRIOR KNOWLEDGE/ PREREQUISITES AND PREPARATION:	K17																			
TEACHING AND EXAMINATIONS LANGUAGE:	GREEK																			
THE COURSE IS OFFERED TO ERASMUS STUDENTS	NO																			

COURSE CONTENT
The course covers basic and advanced techniques of the Theory of Computation that are needed in various branches of Theoretical Computer Science. Formal languages. Deterministic and non-deterministic automata. Regular languages. Context-free languages. Non-deterministic pushdown automata. Turing machines. Recursive languages. Recursively enumerable languages. The Church-Turing Thesis. Decidability and undecidability. Introduction to computational complexity.

STUDENT LEARNING OBJECTIVES
Teaching-Learning Goals-Expected Learning Outcomes The goal of the class is for the student to acquire knowledge in the Theory of Computation that is necessary in computer science. Upon successful completion of the course the student will be able to:

- Distinguish the different categories of formal languages.
- Accurately define automata for formal languages.
- Accurately define context-free grammars for formal languages.
- Prove that given problems are undecidable.
- Construct Turing machines for given recursive languages.

TEACHING AND LEARNING METHODS - ASSESSMENT		
TEACHING METHOD	In Class (Face to Face)	
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	Learning process supported by the web-page of the course (Teaching material; Announcements; Task assignments; Outside links, etc) Email communication. There exists a possibility of lecture transmission.	
TEACHING ORGANIZATION <i>Describe in detail the way and methods of teaching:</i> Enhanced Lectures, Online Lectures, Seminars, Tutorial, Laboratory, Laboratory Exercise, Study & analysis of literature, Practice (Positioning), Interactive teaching, Developing a project, Individual / group work Telework (reference to tools) etc. <i>Details of the student's study hours for each learning activity and hours of non-guided study are shown to ensure that the total workload at the semester corresponds to the ECTS</i>	Activity	Student Workload (hours)
	Lectures	52
	Seminars	13
	Preparation for seminars	15
	Study and analysis of the literature	15
	Preparation for the next lecture	13
	Homework assignments	12
	Independent Study	30
	Total Course (25 hours of workload per unit of credit)	150
	Lectures are supported by transparencies. The board is also used extensively. An emphasis is placed both during the lectures and the seminars on problem solving. Homework assignments are individual or in groups of 2.	

ASSESSMENT OF STUDENTS

Description of the assessment process

Assessment Methods, Formative or Concluding, Multiple Choice Test, Quick Response Questions, Test Development Questions, Problem Solving, Written Work, Report / Report, Oral Examination, Public Presentation, Laboratory Work, Other / Other

Fully defined evaluation criteria are mentioned and if and where they are accessible to students.

Assessment methods	Number	Percentage
Written examination	1	95%
Homeworks	2	5%

Evaluation by written examination and homework assignments.
Grade Feedback is available upon request.

LITERATURE AND STUDY MATERIALS / READING LIST

Basic textbooks in Greek: H. Lewis, Χ. Παπαδημητρίου. Elements of the Theory of Computation, Kritiki publishers.
M. Sipser, Introduction to the theory of computation, Crete University Press.

Additionally the students have access to transparencies by P. Rondogiannis, and recommended literature in English.

INSTITUTION	NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS																			
SCHOOL	SCHOOL OF SCIENCE																			
DEPARTMENT	INFORMATICS AND TELECOMMUNICATIONS																			
COURSE LEVEL	UNDERGRADUATE																			
COURSE TITLE	Compilers																			
COURSE CODE	K31	Semester	6	ECTS	6															
TEACHING HOURS per week	THEORY	4	SEMINAR.	1	LABORATORY	0														
COURSE TYPE	Select one of the following and delete the rest Track Compulsory (EYM) <table border="1"> <thead> <tr> <th>K</th><th>E1</th><th>E2</th><th>E3</th><th>E4</th><th>E5</th><th>E6</th></tr> </thead> <tbody> <tr> <td>A</td><td></td><td></td><td>Y</td><td>B</td><td></td><td></td></tr> </tbody> </table> <i>Fill the table as in the curriculum: Track (A-Computer Science, B- Computer Engineering) / Specialization Compulsory (Y) / Core Specialization (B)/ Elective Specialization (E)</i>						K	E1	E2	E3	E4	E5	E6	A			Y	B		
K	E1	E2	E3	E4	E5	E6														
A			Y	B																
URL	https://eclass.uoa.gr/courses/D38/																			
EXPECTED PRIOR KNOWLEDGE/ PREREQUISITES AND PREPARATION:	K08 Data Structures K10 Object-Oriented Programming Recommended K14, Computer Architecture I																			
TEACHING AND EXAMINATIONS LANGUAGE:	GREEK																			
THE COURSE IS OFFERED TO ERASMUS STUDENTS	YES																			

COURSE CONTENT
Explore the fundamental concepts and techniques behind a compiler: (1) Formal languages: regular languages, context-free languages, attribute grammars; (2) Meta-tools to create lexical analyzers; (3) Parsing: top-down and bottom-up, error recovery, meta-tools to use and create syntax analyzers; (4) Symbol tables. Semantic analysis: kinds of semantic checking, static type systems, dynamic type checking; (5) Generation of intermediate code; (6) Optimization, register allocation; (7) Generation of object code.

STUDENT LEARNING OBJECTIVES
Teaching-Learning Goals Learning of key concepts in compilers and language implementation, develop programming abilities

Expected Learning Outcomes

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

- design a simple formal grammar
- convert an input-output specification into a finite automaton
- process an automaton algorithmically
- implement a simple programming language
- specify the behavior of compilers over complex programs
- design and implement a single language processor or program analyzer

TEACHING AND LEARNING METHODS - ASSESSMENT																				
TEACHING METHOD	In Class (Face to Face)																			
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	Learning process supported by web page, providing homeworks and tutorials Interaction and support forum on the Piazza platform Live transmission of lectures Ability to track recorded lectures																			
TEACHING ORGANIZATION	<table><thead><tr><th>Activity</th><th>Student Workload (hours)</th></tr></thead><tbody><tr><td>Lectures</td><td>52</td></tr><tr><td>Tutorial</td><td>13</td></tr><tr><td>Laboratory</td><td>0</td></tr><tr><td>Teamwork in a case study</td><td>0</td></tr><tr><td>Small individual exercises</td><td>40</td></tr><tr><td>Independent Study</td><td>45</td></tr><tr><td></td><td></td></tr><tr><td>Total Course (25 hours of workload per unit of credit)</td><td>150</td></tr></tbody></table>		Activity	Student Workload (hours)	Lectures	52	Tutorial	13	Laboratory	0	Teamwork in a case study	0	Small individual exercises	40	Independent Study	45			Total Course (25 hours of workload per unit of credit)	150
Activity	Student Workload (hours)																			
Lectures	52																			
Tutorial	13																			
Laboratory	0																			
Teamwork in a case study	0																			
Small individual exercises	40																			
Independent Study	45																			
Total Course (25 hours of workload per unit of credit)	150																			
ASSESSMENT OF STUDENTS	<table><thead><tr><th>Assessment methods</th><th>Number</th><th>Percentage</th></tr></thead><tbody><tr><td>Written examination</td><td>1</td><td>50%</td></tr><tr><td>Exercises</td><td>2</td><td>50%</td></tr><tr><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td></tr></tbody></table>		Assessment methods	Number	Percentage	Written examination	1	50%	Exercises	2	50%									
Assessment methods	Number	Percentage																		
Written examination	1	50%																		
Exercises	2	50%																		

LITERATURE AND STUDY MATERIALS / READING LIST

Alfred V. Aho, Monica S. Lam, Ravi Sethi and Jeffrey D. Ullman Compilers: Principles, Techniques, and Tools. 2nd edition. Addison-Wesley, 2007. <http://dragonbook.stanford.edu/>

Nikolaos S. Papaspyrou and Emmanuel St. Skordalakis, Compilers, Symmetria, Athens, 2002.

K. Lazos, P. Katsaros, Z. Karaikos, Compilers of Programming Languages: Theory and Practice, Thessaloniki 2004
<http://delab.csd.auth.gr/~katsaros/CompilersBook.htm>

INSTITUTION	NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS																			
SCHOOL	SCHOOL OF SCIENCE																			
DEPARTMENT	INFORMATICS AND TELECOMMUNICATIONS																			
COURSE LEVEL	UNDERGRADUATE																			
COURSE TITLE	Electronics																			
COURSE CODE	K19	Semester	6	ECTS	6															
TEACHING HOURS per week	THEORY	3	SEMINAR.	1	LABORATORY															
COURSE TYPE	Select one of the following and delete the rest Compulsory (YM) / Optional Lab (EP) / Track Compulsory (EYM) / Project / General education (ΓΠ) / Electives (ΠΜ) <table border="1"> <thead> <tr> <th>K</th><th>E1</th><th>E2</th><th>E3</th><th>E4</th><th>E5</th><th>E6</th></tr> </thead> <tbody> <tr> <td>B</td><td></td><td></td><td></td><td>Y</td><td>E</td><td></td></tr> </tbody> </table> <i>Fill the table as in the curriculum: Track (A-Computer Science, B- Computer Engineering) / Specialization Compulsory (Y) / Core Specialization (B)/ Elective Specialization (E)</i>						K	E1	E2	E3	E4	E5	E6	B				Y	E	
K	E1	E2	E3	E4	E5	E6														
B				Y	E															
URL	https://eclass.uoa.gr/courses/D15/																			
EXPECTED PRIOR KNOWLEDGE/ PREREQUISITES AND PREPARATION:	Fill out (verbal description).																			
TEACHING AND EXAMINATIONS LANGUAGE:	GREEK																			
THE COURSE IS OFFERED TO ERASMUS STUDENTS	NO																			

COURSE CONTENT
Amplifiers, basic characteristics performance, typical models, frequency response. Operational amplifiers, revering and non reversing topologies, differential amplifiers, integrators, differentiators. Introduction to semiconductors (doped semiconductors, pn junction, bias of a pn junction). Applications of a pn diode (semi, full rectifier, limiter). Special type of diodes (zener, varactor, photodiodes). Bipolar transistors, (structure of the transistor, basic functionality, characteristic curves and parameters, the transistor as an amplifier, as a switch, logic gates). Transistor bias circuits. Basic amplifier topologies (common emitter, common base, common collector). Bipolar small signal amplifiers (equivalent Ac small signal circuits) Frequency response of the amplifier.

STUDENT LEARNING OBJECTIVES

Teaching-Learning Goals-Expected Learning Outcomes

To introduce the students to the basic topics of the Electronics covering the related areas at theoretical and applied level

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

- Explain the basic characteristics of the semiconductor material
- Explain the principle of operation of the semiconductor diodes and bipolar transistors
- Classify the different types of amplifiers regarding their operational characteristics
- Explain the principle of operation of the operational amplifiers
- Describe the topology of the different amplifying schemes and determine their structural parameters using operational amplifiers
- Design rectifying circuits and power supplies using semiconductor diodes
- Design different types of amplifiers using bipolar transistors

TEACHING AND LEARNING METHODS - ASSESSMENT

TEACHING METHOD	In Class (Face to Face)																		
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	Learning process supported by the e-class platform (Discussions, Announcements, Task assignments) Email communication																		
TEACHING ORGANIZATION <i>Describe in detail the way and methods of teaching:</i> Enhanced Lectures, Online Lectures, Seminars, Tutorial, Laboratory, Laboratory Exercise, Study & analysis of literature, Practice (Positioning), Interactive teaching, Developing a project, Individual / group work Telework (reference to tools) etc. <i>Details of the student's study hours for each learning activity and hours of non-guided study are shown to ensure that the total workload at the semester corresponds to the ECTS</i>	<table> <tr> <th>Activity</th><th>Student Workload (hours)</th></tr> <tr> <td>Lectures</td><td>39</td></tr> <tr> <td>Tutorial</td><td>13</td></tr> <tr> <td>Laboratory</td><td></td></tr> <tr> <td>Teamwork in a case study</td><td></td></tr> <tr> <td>Small individual exercises</td><td>40</td></tr> <tr> <td>Independent Study</td><td>48</td></tr> <tr> <td>.....</td><td>...</td></tr> <tr> <td>Total Course (25 hours of workload per unit of credit)</td><td>140</td></tr> </table>	Activity	Student Workload (hours)	Lectures	39	Tutorial	13	Laboratory		Teamwork in a case study		Small individual exercises	40	Independent Study	48		...	Total Course (25 hours of workload per unit of credit)	140
Activity	Student Workload (hours)																		
Lectures	39																		
Tutorial	13																		
Laboratory																			
Teamwork in a case study																			
Small individual exercises	40																		
Independent Study	48																		
.....	...																		
Total Course (25 hours of workload per unit of credit)	140																		

ASSESSMENT OF STUDENTS

Description of the assessment process

Assessment Methods, Formative or Concluding, Multiple Choice Test, Quick Response Questions, Test Development Questions, Problem Solving, Written Work, Report / Report, Oral Examination, Public Presentation, Laboratory Work, Other / Other

Fully defined evaluation criteria are mentioned and if and where they are accessible to students.

Describe explicitly methods, evaluation tools and provided feedback.

The table below is supplemented accordingly.

Assessment methods	Number	Percentage
Written examination	1	85%
Progress		
Exercises	10	15%
Laboratory		
Final work		

LITERATURE AND STUDY MATERIALS / READING LIST

Sedra/Smith, Microelectronic circuits, 7th edition, Publisher Papasotiriou

INSTITUTION	NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS																			
SCHOOL	SCHOOL OF SCIENCE																			
DEPARTMENT	INFORMATICS AND TELECOMMUNICATIONS																			
COURSE LEVEL	UNDERGRADUATE																			
COURSE TITLE	Network Management																			
COURSE CODE	K34	Semester	6	ECTS	6															
TEACHING HOURS per week	THEORY	3	SEMINAR.	1	LABORATORY															
COURSE TYPE	Select one of the following and delete the rest Track Compulsory (EYM) <table border="1"> <thead> <tr> <th>K</th><th>E1</th><th>E2</th><th>E3</th><th>E4</th><th>E5</th><th>E6</th></tr> </thead> <tbody> <tr> <td>B</td><td></td><td></td><td></td><td></td><td>Y</td><td></td></tr> </tbody> </table> <i>Fill the table as in the curriculum: Track (A-Computer Science, B- Computer Engineering) / Specialization Compulsory (Y) / Core Specialization (B)/ Elective Specialization (E)</i>						K	E1	E2	E3	E4	E5	E6	B					Y	
K	E1	E2	E3	E4	E5	E6														
B					Y															
URL	https://eclass.uoa.gr/courses/D73/																			
EXPECTED PRIOR KNOWLEDGE/ PREREQUISITES AND PREPARATION:	K16 Communication Networks																			
TEACHING AND EXAMINATIONS LANGUAGE:	GREEK																			
THE COURSE IS OFFERED TO ERASMUS STUDENTS	NO																			

COURSE CONTENT
The course covers the following topics: - Introduction to the concepts of Network Management - Models for Network Management in fixed and mobile networks - Tools, Mechanisms and Platforms for Network Management Systems - Network Management Protocols (e.g., SNMP) - Management Information Base - Cognitive Network Management - Self-Management concepts - Network Security Management - Data analytics and Machine Learning for Network Management decision making

STUDENT LEARNING OBJECTIVES

Expected Learning Outcomes

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

- Explain the foundations of Network Management principles
- Identify the necessary mechanisms and tools for building a Network Management System
- Design tools exploiting network data for cognitive network management and knowledge based decision making
- Identify and develop mechanisms and tools for network monitoring, operational optimization and self-management (prediction mechanisms for fault identification etc.)

TEACHING AND LEARNING METHODS - ASSESSMENT

TEACHING METHOD	In Class (Face to Face)														
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	Learning process supported by the e-class platform (e.g., Discussions, Announcements, Task assignments, Student groups, Project/exercise delivery) Email communication Live transmission of lectures														
TEACHING ORGANIZATION <i>Describe in detail the way and methods of teaching:</i> Enhanced Lectures, Online Lectures, Seminars, Tutorial, Laboratory, Laboratory Exercise, Study & analysis of literature, Practice (Positioning), Interactive teaching, Developing a project, Individual / group work Telework (reference to tools) etc. <i>Details of the student's study hours for each learning activity and hours of non-guided study are shown to ensure that the total workload at the semester corresponds to the ECTS</i>	<table> <tr> <th>Activity</th><th>Student Workload (hours)</th></tr> <tr> <td>Lectures</td><td>39</td></tr> <tr> <td>Tutorial</td><td>13</td></tr> <tr> <td>Teamwork in a case study</td><td>33</td></tr> <tr> <td>Independent Study</td><td>45</td></tr> <tr> <td>Study of NMS related tools</td><td>20</td></tr> <tr> <td>Total Course (25 hours of workload per unit of credit)</td><td>150</td></tr> </table>	Activity	Student Workload (hours)	Lectures	39	Tutorial	13	Teamwork in a case study	33	Independent Study	45	Study of NMS related tools	20	Total Course (25 hours of workload per unit of credit)	150
Activity	Student Workload (hours)														
Lectures	39														
Tutorial	13														
Teamwork in a case study	33														
Independent Study	45														
Study of NMS related tools	20														
Total Course (25 hours of workload per unit of credit)	150														

ASSESSMENT OF STUDENTS

Description of the assessment process

Assessment Methods, Formative or Concluding, Multiple Choice Test, Quick Response Questions, Test Development Questions, Problem Solving, Written Work, Report / Report, Oral Examination, Public Presentation, Laboratory Work, Other / Other

Fully defined evaluation criteria are mentioned and if and where they are accessible to students.

Describe explicitly methods, evaluation tools and provided feedback.

The table below is supplemented accordingly
Students are evaluated based on team projects/exercises and oral exams. In oral exams both the theoretical as well as the technical skills are evaluated. The team project is evaluated based on several criteria, which are explained to the students in the beginning of the semester.

Assessment methods	Number	Percentage
Oral examination	1	50%
Final work	1	50%

LITERATURE AND STUDY MATERIALS / READING LIST

1. Computer Network Management, Miliou Amalia N., Nikopolitidis Petros, Pomportsis Andreas S.. ISBN: 978-960-418-133-9
2. Wireless Communication Networks and Systems, Stallings W. - Beard C. ISBN: 978-960-418-549-8

D. PROJECT

INSTITUTION	NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS																			
SCHOOL	SCHOOL OF SCIENCE																			
DEPARTMENT	INFORMATICS AND TELECOMMUNICATIONS																			
COURSE LEVEL	UNDERGRADUATE																			
COURSE TITLE	Software Development for Algorithmic Problems																			
COURSE CODE	K23γ	Semester	7	ECTS	8															
TEACHING HOURS per week	THEORY	1	SEMINAR.		LABORATORY	3														
COURSE TYPE	Select one of the following and delete the rest Project <table border="1"> <thead> <tr> <th>K</th><th>E1</th><th>E2</th><th>E3</th><th>E4</th><th>E5</th><th>E6</th></tr> </thead> <tbody> <tr> <td>A</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </tbody> </table> <i>Fill the table as in the curriculum: Track (A-Computer Science, B- Computer Engineering) / Specialization Compulsory (Y) / Core Specialization (B)/ Elective Specialization (E)</i>						K	E1	E2	E3	E4	E5	E6	A						
K	E1	E2	E3	E4	E5	E6														
A																				
URL	https://eclass.uoa.gr/courses/DI352/																			
EXPECTED PRIOR KNOWLEDGE/ PREREQUISITES AND PREPARATION:	K17- Algorithms and Complexity (Αλγόριθμοι και Πολυπλοκότητα) Recommended: K25 – Theory of Computation (Θεωρία Υπολογισμού)																			
TEACHING AND EXAMINATIONS LANGUAGE:	GREEK																			
THE COURSE IS OFFERED TO ERASMUS STUDENTS	NO																			

COURSE CONTENT
The course focuses on the development of software for solving an important problem in Computer Science, on the use of the software in a real application and on its experimental evaluation. The followed approach aims at the familiarization of the students with large scale programming, often with the use of open source software libraries through team work as well as at the development of skills for the implementation and practical utilization of established, efficient algorithms. C/C++ is used as a programming language in the course. Topics covered include the implementation of efficient algorithms, their experimental evaluation, software organization and design principles, the use of open source libraries and software tools such as: Qt, Boost, Gnuplot, LAPACK, Eigen, Unit testing frameworks, collaboration and version control systems such as git and SVN as well as collaborative large scale implementation. Three assignments for the design and development of

software for solving hard algorithmic problems are given with emphasis on the fields of data science and computational geometry.

STUDENT LEARNING OBJECTIVES

Expected Learning Outcomes

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

- Describe and explain hard algorithmic problems.
- Select appropriate programming techniques and algorithms for solving difficult problems in Computer Science.
- Install and use open source libraries and software tools such as Qt, Boost, Gnuplot, LAPACK, Eigen, Unit testing frameworks, collaboration and version control systems (git and SVN).
- Implement algorithms according to design principles that permit their easy reuse.
- Execute an experimental evaluation of the algorithmic techniques and of the software, in general, as well as produce reports presenting accurately and clearly the experimental results.

TEACHING AND LEARNING METHODS - ASSESSMENT

TEACHING METHOD	In Class (Face to Face)						
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	Learning process supported by the e-class platform (Course description, Material Provision, Announcements, Calendar, Student Teams, Assignments, Discussion forum, External links) Email communication Live transmission of lectures Ability to track recorded lectures						
TEACHING ORGANIZATION	<i>Describe in detail the way and methods of teaching:</i> Enhanced Lectures, Online Lectures, Seminars, Tutorial, Laboratory, Laboratory Exercise, Study & analysis of literature, Practice (Positioning), Interactive teaching, Developing a project, Individual / group work Telework (reference to tools) etc. <i>Details of the student's study hours for each learning activity and hours of non-guided study are shown to ensure that the total workload at the semester corresponds to the ECTS</i> <table border="1"> <thead> <tr> <th>Activity</th><th>Student Workload (hours)</th></tr> </thead> <tbody> <tr> <td>Lectures</td><td>13</td></tr> <tr> <td>Tutorial</td><td>26</td></tr> </tbody> </table>	Activity	Student Workload (hours)	Lectures	13	Tutorial	26
Activity	Student Workload (hours)						
Lectures	13						
Tutorial	26						

	Laboratory	13
	1 st assignment	40
	2 nd assignment	40
	3 rd assignment	40
	Independent study in order to understand the algorithms and to be familiarized with the libraries and software tools.	28
	Total Course (25 hours of workload per unit of credit)	200
ASSESSMENT OF STUDENTS <i>Description of the assessment process</i> <i>Assessment Methods, Formative or Concluding, Multiple Choice Test, Quick Response Questions, Test Development Questions, Problem Solving, Written Work, Report / Report, Oral Examination, Public Presentation, Laboratory Work, Other / Other</i> <i>Fully defined evaluation criteria are mentioned and if and where they are accessible to students.</i>	Students are evaluated through an oral examination of each consecutive assignment. The assignments are assessed on the basis of graded criteria and have equal weight in the final evaluation. Students are given the opportunity to request an analysis of the evaluation of their assignments. The evaluation is corrected in case of an error.	
	Assessment methods	Number
	Assignments	3
		Percentage
		100%

LITERATURE AND STUDY MATERIALS / READING LIST
Textbook for general C/C++ programming (Εύδοξος): Bruce Eckel, <i>Thinking in C++, vol. 2</i>, εκδόσεις Μ. Γκιούρδας, 2009 Scientific publication that change from year to year according to the examined algorithmic problems. PDF/powerpoint presentations for the description of the examined problems, the algorithmic techniques, software organization and design principles as well as for all the libraries and software tools which are used in the course.

INSTITUTION	NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS						
SCHOOL	SCHOOL OF SCIENCE						
DEPARTMENT	INFORMATICS AND TELECOMMUNICATIONS						
COURSE LEVEL	UNDERGRADUATE						
COURSE TITLE	Software Development for Information Systems						
COURSE CODE	K23a		Semester	7	ECTS	8	
TEACHING HOURS per week	THEORY	1	SEMINAR.	4	LABORATORY	1	
COURSE TYPE	Select one of the following and delete the rest						
	Project						
	K	E1	E2	E3	E4	E5	E6
	B						
URL	https://eclass.uoa.gr/courses/D29/						
EXPECTED PRIOR KNOWLEDGE/ PREREQUISITES AND PREPARATION:	K18 - Implementation of Database Management Systems						
TEACHING AND EXAMINATIONS LANGUAGE:	GREEK						
THE COURSE IS OFFERED TO ERASMUS STUDENTS	NO						

COURSE CONTENT
Extensive implementation of software systems, based on the contents of other courses, in three consecutive phases: a) Implementation of a simplified form of various internal layers of a Database Management System: block and record organization on disk, a static data structure on a file on disk (e.g., static hash table), a dynamic data structure on a file on disk (e.g., B+ tree), system catalogs, query processing for a simple database query language. b) Implementation of an application on top of some commercial Database Management System or the Internet or software based on some other technology, c) Adding multithreading support and other optimization features to the application of the previous phases. Emphasis is given in software development techniques, i.e. use of source control systems (git), unit testing, etc. The project concept is usually inspired from the previous SIGMOD programming contest. A team of selected students take part as a NKUA team to the current year SIGMOD programming contest, and are evaluated based on their participation and effectiveness in the competition.

STUDENT LEARNING OBJECTIVES

Teaching-Learning Goals-Expected Learning Outcomes

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

- Design and implement applications and software systems using C or C++.
- Design and implement data structures for database systems.
- Use source control system for maintaining their code.
- Create and maintain unit tests for their code
- Optimize their code performance using software tools
- Work as a team member developing software
- Record and analyze the technical and functional requirements of information systems software

TEACHING AND LEARNING METHODS - ASSESSMENT

TEACHING METHOD	In Class (Face to Face)														
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	Learning process supported by the e-class platform (specify which specific tools you use, eg Hardware delivery, Discussions, Announcements, Task assignments, Student groups) Email communication Live transmission of lectures Ability to track recorded lectures Utilization of educational environments (please specify name and http) Utilization of Specialized Software														
TEACHING ORGANIZATION <i>Describe in detail the way and methods of teaching:</i> Enhanced Lectures, Online Lectures, Seminars, Tutorial, Laboratory, Laboratory Exercise, Study & analysis of literature, Practice (Positioning), Interactive teaching, Developing a project, Individual / group work Telework (reference to tools) etc. <i>Details of the student's study hours for each learning activity and hours of non-guided study are shown to ensure that the total workload at the semester corresponds to the ECTS</i>	A series of lectures and tutorials introduce the students to concepts, technologies and software development tools that will be used for the project. The project goal is to develop a system optimizing the operation of an information system. The project concept is inspired by the previous SIGMOD programming contest. Student teams of 2 or 3 persons are created, depending on the project's requirements. <table> <tr> <th>Activity</th><th>Student Workload (hours)</th></tr> <tr> <td>Lectures</td><td>12</td></tr> <tr> <td>Tutorial</td><td>9</td></tr> <tr> <td>Laboratory</td><td>3</td></tr> <tr> <td>Teamwork in a case study</td><td>200</td></tr> <tr> <td>Independent Study</td><td>26</td></tr> <tr> <td>Total Course</td><td>250</td></tr> </table>	Activity	Student Workload (hours)	Lectures	12	Tutorial	9	Laboratory	3	Teamwork in a case study	200	Independent Study	26	Total Course	250
Activity	Student Workload (hours)														
Lectures	12														
Tutorial	9														
Laboratory	3														
Teamwork in a case study	200														
Independent Study	26														
Total Course	250														

	(25 hours of workload per unit of credit)																			
ASSESSMENT OF STUDENTS <i>Description of the assessment process</i> Assessment Methods, Formative or Concluding, Multiple Choice Test, Quick Response Questions, Test Development Questions, Problem Solving, Written Work, Report / Report, Oral Examination, Public Presentation, Laboratory Work, Other / Other Fully defined evaluation criteria are mentioned and if and where they are accessible to students.	Describe explicitly methods, evaluation tools and provided feedback. The table below is supplemented accordingly. <i>The evaluation is performed (a) with the delivery of a software system in 3 phases, which is presented and orally examined in the lab, and (b) with an online programming evaluation in the lab</i> <i>The final grade is the evaluation of the software system. The oral examination in the first two phases is used to provide feedback on the course of the development and to determine the progress of the team. Teams that have not met the minimum set requirements cannot continue. After delivering the final software system, the online programming evaluation is used to determine a pass/fail review of each student. Students who fail the programming evaluation, fail the class. Students who pass the programming evaluation, receive the software system grade.</i> <table> <tr> <th>Assessment methods</th><th>Number</th><th>Percentage</th></tr> <tr> <td>Oral examination/delivery of 1st phase software system</td><td>1</td><td>-</td></tr> <tr> <td>Oral examination/delivery of 2nd phase software system</td><td>1</td><td>-</td></tr> <tr> <td>Oral examination/delivery of 2nd phase software system</td><td>1</td><td>100%</td></tr> <tr> <td>Programming Evaluations</td><td>1</td><td>-</td></tr> <tr> <td>Final</td><td></td><td>As described above</td></tr> </table>	Assessment methods	Number	Percentage	Oral examination/delivery of 1 st phase software system	1	-	Oral examination/delivery of 2nd phase software system	1	-	Oral examination/delivery of 2nd phase software system	1	100%	Programming Evaluations	1	-	Final		As described above	
Assessment methods	Number	Percentage																		
Oral examination/delivery of 1 st phase software system	1	-																		
Oral examination/delivery of 2nd phase software system	1	-																		
Oral examination/delivery of 2nd phase software system	1	100%																		
Programming Evaluations	1	-																		
Final		As described above																		

LITERATURE AND STUDY MATERIALS / READING LIST

No specific textbook. The instructor suggests educational resources online as well as manuals of the technologies, software systems and software development tools used.

INSTITUTION	NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS													
SCHOOL	SCHOOL OF SCIENCE													
DEPARTMENT	INFORMATICS AND TELECOMMUNICATIONS													
COURSE LEVEL	UNDERGRADUATE													
COURSE TITLE	Software Development for Network and Telecommunication Systems													
COURSE CODE	K23β		Semester		7		ECTS		8					
TEACHING HOURS per week	THEORY		1		SEMINAR.		4		LABORATORY		1			
COURSE TYPE	Project													
	K		E1		E2		E3		E4		E5		E6	
	B													
URL	https://eclass.uoa.gr/courses/DI292/													
EXPECTED PRIOR KNOWLEDGE/ PREREQUISITES AND PREPARATION:	K16 - COMMUNICATION NETWORKS I													
TEACHING AND EXAMINATIONS LANGUAGE:	GREEK													
THE COURSE IS OFFERED TO ERASMUS STUDENTS	NO													

COURSE CONTENT
Students have to develop a project which consists of an extensive implementation of network functions, protocols and applications. The approach aims at gradually familiarizing with programming at different network levels. More specifically, it includes software development for fixed and mobile networks and Future Internet applications, mobile and wireless systems. Applications and implementations also involve cognitive and remodeling mobile and wireless communications environments (using, for example, J2ME, Android). Indicative covered issues are as follows. • The JAVA programming language • The Android operating system and the application development environment on it • The git publishing control system • The Internet of Things • The MQ Telemetry Transport (MQTT) messaging protocol as well as software / development environments for MQTT

STUDENT LEARNING OBJECTIVES

Expected Learning Outcomes

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

- Design and implement software applications and systems using the JAVA programming language.
- Design and implement mobile apps for the Android operating system.
- Use software publishing control system.
- Uses integrated software development environments (IDEs).
- Design and implement applications based on client-server and publish-subscribe models.
- Design and implement applications using the MQTT protocol.
- Work in a team for software development.
- Record and analyze the technical and operational requirements of network and telecommunication software.

TEACHING AND LEARNING METHODS - ASSESSMENT		
TEACHING METHOD	In Class (Face to Face)	
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	Learning process supported by the e-class platform (Teaching material, Videolectures, Discussions, Announcements, Task assignments)	
	Email communication Live transmission of lectures Ability to watch recorded lectures Utilization of educational environments: Git based publishing control system https://anapgit.scanlab.gr/ Utilization of Special software: Android SDK, Java IDE	
TEACHING ORGANIZATION <i>Describe in detail the way and methods of teaching:</i> Enhanced Lectures, Online Lectures, Seminars, Tutorial, Laboratory, Laboratory Exercise, Study & analysis of literature, Practice (Positioning), Interactive teaching, Developing a project, Individual / group work Telework (reference to tools) etc. <i>Details of the student's study hours for each learning activity and hours of non-guided study are shown to ensure that the total workload at the semester corresponds to the ECTS</i>	A series of lectures (Theory, Tutorial) introduces the concepts, technologies and software development environments to be used for the project. The project is about developing a distributed application system on mobile devices and servers. The application is different each academic year. Students work together in groups of 2 to 4 people, depending on the requirements of the project. Lectures are broadcasted live and recorded to be available to students at any time.	
	Activity	Student Workload (hours)
	Lectures	12
	Tutorial	9
	Laboratory	3
	Code Development	200
	Independent Study	26
	Total Course	250

ASSESSMENT OF STUDENTS Description of the assessment process Assessment Methods, Formative or Concluding, Multiple Choice Test, Quick Response Questions, Test Development Questions, Problem Solving, Written Work, Report / Report, Oral Examination, Public Presentation, Laboratory Work, Other / Other Fully defined evaluation criteria are mentioned and if and where they are accessible to students.	Students are assessed a) by delivering a project in 2 phases by oral examination with demonstration of the application in the laboratory, at the end of each phase and b) by a final written examination. The rating of each phase of the project represents 50% of the degree of the project. The assignment is assessed with graduated criteria and communicated to the students. The written examination covers both the theoretical part of the subject matter and the programming. Complaints and retrains are allowed. The final grade is as follows: If the difference between the project grade and the written examination is up to 2 points, then the final grade is the grade of the project. Otherwise, the final grade is the average of the project grade and the grade of the written examination.		
	Assessment methods	Number	Percentage
	Oral examination / demonstration / check of the first deliverable	1	50%
	Oral examination / demonstration / check of the second deliverable	1	50%
	Written examination	1	100%
Final grade		as described above	

LITERATURE AND STUDY MATERIALS / READING LIST
The course does not have a specific workbook for students. The teacher / tutor proposes educational resources on the internet and manuals of the technologies, software and software development environments used for the project implementation.

Institution	NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS																			
SCHOOL	SCHOOL OF SCIENCE																			
DEPARTMENT	INFORMATICS AND TELECOMMUNICATIONS																			
COURSE LEVEL	UNDERGRADUATE																			
COURSE TITLE	Hardware / Software Codesing for Embedded Systems																			
COURSE CODE	K23δ	Semester	8	ECTS	8															
TEACHING HOURS per week	THEORY	3	SEMINAR		LABORATORY	3														
COURSE TYPE	Select one of the following and delete the rest Project <table border="1"> <tr> <td>K</td><td>E1</td><td>E2</td><td>E3</td><td>E4</td><td>E5</td><td>E6</td></tr> <tr> <td>B</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </table> <i>Fill the table as in the curriculum: Track (A-Computer Science, B- Computer Engineering) / Specialization Compulsory (Y) / Core Specialization (B)/ Elective Specialization (E)</i>						K	E1	E2	E3	E4	E5	E6	B						
K	E1	E2	E3	E4	E5	E6														
B																				
URL	https://eclass.uoa.gr/courses/D269/																			
EXPECTED PRIOR KNOWLEDGE/ PREREQUISITES AND PREPARATION:	ΥΣ03 - Digital Systems Design - VHDL																			
TEACHING AND EXAMINATIONS LANGUAGE:	GREEK																			
THE COURSE IS OFFERED TO ERASMUS STUDENTS	NO																			

COURSE CONTENT
Embedded Systems (ES) are "systems of the real world" where sensors, processors, memories, peripherals and software are tightly integrated into an efficient special purpose system interacting with its environment. This course focuses on the Hardware / Software co-design of Embedded Systems as well as on their implementation in the laboratory using an FPGA development card with reconfigurable logic and a built-in ARM microprocessor. The course covers: ES design and implementation technologies (Microcontrollers, FPGAs, Hybrid). Intellectual Property (IP) cores and their interconnection, Systems-on-Chip, Networks-on-Chip. Embedded software, multi-processing management techniques, real-time operating system kernels. Hierarchical design of embedded systems using hardware description languages (VHDL) and hardware synthesis, high-level synthesis tools. Low power design and energy minimization techniques. Design of computational embedded systems combining a general purpose and special purpose processors into the same integrated circuit (Multiprocessor Systems on Chip). Modeling and simulation of ES. Examples of embedded systems in telecommunications, low power digital

signal/image processing, robotics. Distributed ES: Wireless Sensor Networks, Internet of Things. ESs for artificial intelligence and biomedical applications. *In the Laboratory*: Phased design using VHDL and embedded software development of a System-on-Chip built around an ARM microprocessor and implemented using an FPGA development board.

STUDENT LEARNING OBJECTIVES

Teaching-Learning Goals-Expected Learning Outcomes

Introduce students to embedded systems and train them in their efficient design (hardware), development (software) and implementation (integration) using an FPGA development board and synthesis tools in the lab.

Upon successful completion of the course (theory and lab), a student will be able to:

- Mention the distinguishing features of ES architectures, how they have evolved, where the technology and research are heading in this very dynamic field of computer science and engineering
- Evaluate ES architectures in terms of their performance, energy and area efficiency and suitability for different applications
- Design, develop, simulate, implement and test Embedded Systems-on-Chip for FPGAs
- Design, develop, run and debug embedded software applications, evaluate and improve their performance
- Use hardware/ software development workflows and tools for embedded systems design and implementation
- Integrate available IP cores for memory, GPIO, DMA etc. using suitable on-chip busses/interfaces.

TEACHING AND LEARNING METHODS - ASSESSMENT

TEACHING METHOD	In Class (Face to Face) In the Lab (face to face)	
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	Support the learning process through the e-class platform. Specifically it is used for: Course Description, Materials distribution, Technical User Guides, Announcements, Calendar, Assignment and Submission of Assignments, Questionnaires, External Links E-mail communication	
TEACHING ORGANIZATION <i>Describe in detail the way and methods of teaching: Enhanced Lectures, Online Lectures, Seminars, Tutorial, Laboratory, Laboratory Exercise, Study & analysis of literature, Practice (Positioning), Interactive teaching, Developing a project, Individual / group work Telework (reference to tools) etc.</i>	Activity	Student Workload (hours)
	Lectures	39
	Laboratory	36
	Learning design tools	10
	Project execution (3 phases)	80
	Literature study	15
	Independent Study	20
	Total Course	200
	The theory is presented in class using slides and related articles from the literature. The laboratory project is organized into three stages (milestones) to check continuous student progress as an embedded system-on-chip is	

<i>Details of the student's study hours for each learning activity and hours of non-guided study are shown to ensure that the total workload at the semester corresponds to the ECTS</i>	gradually designed and built in the lab, initially using simulation and then hardware synthesis, software development and implementation (integration) using an FPGA development board. Students are practicing in the laboratory individually. Detailed instructions and implementation tips are provided at all stages of the hardware / software co-design in the lab. For the theory part, students can instead of the final exam choose to perform an independent research study on a related subtopic that they choose jointly with the instructor and write/present a term paper.												
ASSESSMENT OF STUDENTS <i>Description of the assessment process</i> <i>Assessment Methods, Formative or Concluding, Multiple Choice Test, Quick Response Questions, Test Development Questions, Problem Solving, Written Work, Report / Report, Oral Examination, Public Presentation, Laboratory Work, Other / Other</i> <i>Fully defined evaluation criteria are mentioned and if and where they are accessible to students.</i>	Students are evaluated in the lab at the end of each milestone of the project by oral examination after demonstration of their results. They have to complete a milestone and be tested successfully to proceed on to the next one. The term research paper results are presented to the class during the examinations period and are also summarized in a required technical report. The work in the class and the lab is evaluated with graduated criteria communicated to the student <table><tr><th>Assessment methods</th><th>Number</th><th>Percentage</th></tr><tr><td>Lab Performance (3 milestones and final report)</td><td></td><td>70%</td></tr><tr><td>Term paper- presentation and report</td><td></td><td>30%</td></tr><tr><td></td><td></td><td></td></tr></table>	Assessment methods	Number	Percentage	Lab Performance (3 milestones and final report)		70%	Term paper- presentation and report		30%			
Assessment methods	Number	Percentage											
Lab Performance (3 milestones and final report)		70%											
Term paper- presentation and report		30%											

LITERATURE AND STUDY MATERIALS / READING LIST
Basic textbook «Σχεδιασμός Κυκλωμάτων με VHDL», V. Pedroni, Επιμέλεια: Γ. Θεοδωρίδης, Εκδόσεις Κλειδάριθμος, ISBN: 978-960-461-118-8. Alternative textbook: Marwedel, Peter, <i>Embedded System Design, Embedded Systems Foundations of Cyber-Physical Systems</i>, 2nd Edition, ISBN: 978-94-007-0256-1 Also discussed literature articles and detailed lecture transparencies are provided on eclass

E. GENERAL COURSES (ΓΠ)

INSTITUTION	NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS																			
SCHOOL	SCHOOL OF SCIENCE																			
DEPARTMENT	INFORMATICS AND TELECOMMUNICATIONS																			
COURSE LEVEL	UNDERGRADUATE																			
COURSE TITLE	Introduction to Computer Science and Telecommunications																			
COURSE CODE	ΓΠ07		SEMESTER	1	ECTS	2														
TEACHING HOURS per week	THEORY	2	SEMINAR.		LAB.															
COURSE TYPE	GENERAL EDUCATION (GE) <table border="1"> <thead> <tr> <th>K</th><th>E1</th><th>E2</th><th>E3</th><th>E4</th><th>E5</th><th>E6</th></tr> </thead> <tbody> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </tbody> </table> <i>Συμπληρώστε τον πίνακα όπως στο πρόγραμμα σπουδών: Κατεύθυνση (Α, Β) / Υποχρεωτικό Ειδίκευσης (Υ) / Βασικό Ειδίκευσης (Β)/ Επιλογής Ειδίκευσης (Ε)</i>						K	E1	E2	E3	E4	E5	E6							
K	E1	E2	E3	E4	E5	E6														
URL	https://eclass.uoa.gr/courses/D253/																			
PREREQUISITES	-																			
TEACHING AND EXAMINATIONS LANGUAGE	GREEK																			
THE COURSE IS OFFERED TO ERASMUS STUDENTS	NO																			

COURSE CONTENT
The course objective is to enable first year students to become accustomed with basic concepts and themes of the science of Information Technology and Telecommunications such as the Turing Model and the von Neumann Model, Data Storage and Management, Theory and Calculation Models, Operating Systems, Networking and Internet, Software Engineering and Security.

STUDENT LEARNING OBJECTIVES
Upon successful completion of the course the student will be able to: • Describe the Turing and Von Neumann models • Distinguish between computational concepts, complexity and computational complexity • Convert number representations between different arithmetic systems and perform related operations

- Name the main parts of CPU and describe their function
- Distinguish between hard drive, main memory and other storage units
- Name the basic categories of software and identify their differences
- List the components of an operating system and describe their operation
- List network categories and identify devices to connect to a network
- Describe the phases of the software life cycle
- Give examples of data security

TEACHING AND LEARNING METHODS - ASSESSMENT		
TEACHING METHOD	In Class (Face to Face)	
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	Exploitation and Use of the Learner Centered Learning (LcL) Learning Environment https://lcl.di.uoa.gr/ through the development of activities related to the content of the course. Assignment / Submission / Evaluation of activities through the LcL environment.	
	Support of the learning process through the e-class platform. Specifically: Course description, Material provision, Announcements, Messages, Discussion about course concepts and LcL activities and Provision of Feedback. E-mail communication.	
TEACHING ORGANIZATION <i>Describe in detail the way and methods of teaching:</i> Enhanced Lectures, Online Lectures, Seminars, Tutorial, Laboratory, Laboratory Exercise, Study & analysis of literature, Practice (Positioning), Interactive teaching, Developing a project, Individual / group work Telework (reference to tools) etc. <i>Details of the student's study hours for each learning activity and hours of non-guided study are shown to ensure that the total workload at the semester corresponds to the ECTS</i>	The theoretical part of the course takes place in a classroom using various tools such as slides and videos and other teaching techniques in order to motivate student participation through brainstorming, questions and answers, discussions and various activities. Optional activities in the online learning environment LcL are also included. These are assigned alongside the theoretical part of the course. The engagement of students in the LcL activities and the feedback provided by it contribute to the learning and consolidation of the subject matter by students, which is also the main purpose of LcL's inclusion in the teaching of the course.	
	Activity	Student Workload (hours)
	Lectures	26
	OPTIONAL Activities in LcL	(25)
	Preparation for the Exams	24
	Total Course Work	50 (+25)

ASSESSMENT OF STUDENTS

Description of the assessment process

Assessment Methods, Formative or Concluding, Multiple Choice Test, Quick Response Questions, Test Development Questions, Problem Solving, Written Work, Report / Report, Oral Examination, Public Presentation, Laboratory Work, Other / Other

Fully defined evaluation criteria are mentioned and if and where they are accessible to students.

Students are examined through a final written examination and through performing optional activities in the adaptive learning environment LcL. Optional LcL activities give a bonus of up to 2 units. For example, if the grade in the written exams is 7 units and the student has completed all of the assigned LcL activities, the final grade is $7 + 2 = 9$.

Assessment Methods	Number	Percentage
Written Exams	1	100%
Bonus for performing optional activities in LcL	10	Max Bonus 20%

LITERATURE AND STUDY MATERIAL / READING LIST

Study Material:

1. «Computer Science – An Overview» (J. Glenn Brookshear, 10th Edition, Εκδόσεις Κλειδάριθμος)
2. «Foundations of Computer Science» (Behrouz A. Forouzan, Cengage Learning, 2014)

Reading List

Course Notes on e-class

INSTITUTION	NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS					
SCHOOL	SCHOOL OF SCIENCE					
DEPARTMENT	INFORMATICS AND TELECOMMUNICATIONS					
COURSE LEVEL	UNDERGRADUATE					
COURSE TITLE	Structure and Institutions of the European Union					
COURSE CODE	ΓΠ03	Semester	7	ECTS	2	
TEACHING HOURS per week	THEORY	2	SEMINAR.		LABORATORY	
COURSE TYPE	Compulsory(YM) General education (ΓΠ)					
URL	https://eclass.uoa.gr/courses/D82/					
EXPECTED PRIOR KNOWLEDGE/ PREREQUISITES AND PREPARATION:						
TEACHING AND EXAMINATIONS LANGUAGE:	GREEK					
THE COURSE IS OFFERED TO ERASMUS STUDENTS	NO					

COURSE CONTENT

The course presents the most important aspects of European economic and political integration and covers the following topics: Basic concepts and methodology for approaching the EU phenomenon. Economic integration and political unification. Basic theories on political consolidation (federation, neo-functioning, interdependence, theory of international regimes, intergovernment), critical evaluation of these theories. The legal order of the European Union, primary and secondary law. Institutional constitution, development and evolution of the institutional system. Policy-making and decision-making processes. Basic policies (economic policy, research, employment and integration into the labor market, education, vocational training and lifelong learning). European Union Structural Funds, Finances and Programs.

STUDENT LEARNING OBJECTIVES

Teaching-Learning Goals-Expected Learning Outcomes

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

- Recognize and specify the concepts of international and European economic integration.

- Distinguish the concepts of economic integration and political unification.
- Identify national and supranational institutions.
- Distinguish their institutions and responsibilities, as well as the procedures on the basis of which union rules are produced.
- Mention the key policies of the European Union.
- Evaluate the benefits and problems of deepening and enlarging the European Union.
- Draw information on EU programs and funding.
- Be concerned about the impact and the impact of European Union policies at national level.

TEACHING AND LEARNING METHODS - ASSESSMENT												
TEACHING METHOD	In Class (Face to Face)											
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	• Use ICT in Teaching. • Support the learning process through the course's website. Notes and educational material, etc. • Useful links from Greek and European websites related to European Union policies, financial tools and programs.											
TEACHING ORGANIZATION <i>Describe in detail the way and methods of teaching: Enhanced Lectures, Online Lectures, Seminars, Tutorial, Laboratory, Laboratory Exercise, Study & analysis of literature, Practice (Positioning), Interactive teaching, Developing a project, Individual / group work Telework (reference to tools)etc. Details of the student's study hours for each learning activity and hours of non-guided study are shown to ensure that the total workload at the semester corresponds to the ECTS</i>	Lectures include teaching techniques such as: questions and answers, discussion, brainstorming, case study which concern proposals for funding from European Union programs. <table><tr><th>Activity</th><th>Student Workload (hours)</th></tr><tr><td>Lectures</td><td>26</td></tr><tr><td>Individual Work</td><td>12</td></tr><tr><td>Independent Study</td><td>12</td></tr><tr><td>Total Course</td><td>50</td></tr></table>		Activity	Student Workload (hours)	Lectures	26	Individual Work	12	Independent Study	12	Total Course	50
Activity	Student Workload (hours)											
Lectures	26											
Individual Work	12											
Independent Study	12											
Total Course	50											
ASSESSMENT OF STUDENTS <i>Description of the assessment process</i> <i>Assessment Methods, Formative or Concluding, Multiple Choice Test, Quick Response Questions, Test Development Questions, Problem Solving, Written Work, Report / Report, Oral Examination, Public Presentation, Laboratory Work, Other / Other Fully defined evaluation criteria are mentioned and if and where they are accessible to students.</i>	Students are assessed through a written examination that includes multiple choice questions and evaluation of theory data as well as a work. <table><tr><th>Assessment methods</th><th>Number</th><th>Percentage</th></tr><tr><td>Written examination</td><td>1</td><td>70%</td></tr><tr><td>Works</td><td>1</td><td>30%</td></tr></table>		Assessment methods	Number	Percentage	Written examination	1	70%	Works	1	30%	
Assessment methods	Number	Percentage										
Written examination	1	70%										
Works	1	30%										

LITERATURE AND STUDY MATERIALS / READING LIST

- Maravegias, N. & Tsinisizelis, M. The New European Union, Organization and Policies, 50 years. Themelio Publications, 2007.
- Gioti - Papadaki, O. "European Political Integration and Solidarity Policies". Kritiki Publications 2004.
- Ioakeimidis, P.K. European Political Union. Themelio Publications, 1995.
- Ioakeimidis, P.K. European Political Union. Theory, Negotiation, Institutions and Policies, Athens, Themelio publications, 1993.
- Lavdas, K.A. Creation and evolution of the European Community. EAP, 2003.
- Hellenic University Association of European Studies. Introduction to European Studies Volume A: Sideris Publications, 2001.
- Moussis, N, . From the European Community to the European Union - Institutions and Policies. Papazisis Publications, 2000.
- Andrikopoulou, E. & Kafkalas, Gr. The new European area. Enlargement and the geography of European growth, Athens, Themelio Publications, 2000.
- Course notes.

- Useful links

- European Union
- European Parliament
- European Commission
- Legislation
- European Community agencies
- European Regional Development Fund
- European social fund
- European Social Fund - Actions in Greece
- Employment, Social Affairs and Equal Opportunities
- Agriculture and Rural Development
- Europe Direct Information Network
- European Commission - Aid and loans
- European Commission - Delegation in Greece
- General Secretariat for Research and Technology gsrt.gr

INSTITUTION	NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS					
SCHOOL	SCHOOL OF SCIENCE					
DEPARTMENT	INFORMATICS AND TELECOMMUNICATIONS					
COURSE LEVEL	UNDERGRADUATE					
COURSE TITLE	Project Management and Techniques for Presenting and Writing Scientific Reports					
COURSE CODE	ΓΠ05		Semester	8	ECTS	2
TEACHING HOURS per week	THEORY	2	SEMINAR.		LABORATORY	
COURSE TYPE	Compulsory(YM) General education (ΓΠ)					
URL	https://eclass.uoa.gr/courses/D82/					
EXPECTED PRIOR KNOWLEDGE/ PREREQUISITES AND PREPARATION:	-					
TEACHING AND EXAMINATIONS LANGUAGE:	GREEK					
THE COURSE IS OFFERED TO ERASMUS STUDENTS	NO					

COURSE CONTENT
The course includes the main body of knowledge and skills in Project Management and covers the following topics: Introduction to Management-Management of Projects - Basic Concepts. Life Cycle, Phases and Key Elements in Project Management. Environment of projects, stakeholders, roles and responsibilities. Organizational structures in the execution of projects. Selection of projects - selection methods (cost benefit analysis, repayment period of invested funds, return on investment, net present value). Structural analysis of projects. Time scheduling, programming methods. Programming and resource allocation, resource types. Economic approach of projects - costing. Risk and uncertainty management (risk identification, valuation, management plan). Monitoring and control of projects, techniques and control content. Evaluation of projects.

STUDENT LEARNING OBJECTIVES
Teaching-Learning Goals-Expected Learning Outcomes Upon successful completion of the course the student will be able to: Describe the basic concepts of project management, as well as the individual phases of their life cycle.

- Identify ways of organization - organizational structures for the execution of projects, their advantages and disadvantages.
- Recognize and apply selection and evaluation methods for projects.
- Apply timing methods.
- Draft the budget of the projects.
- Calculate the cost of the projects.
- Record and estimate the risks of the projects.
- Identify and implement project tracking techniques with respect to their basic dimensions.
- Evaluate the results of the implementation of the projects.
- Prepare a project case study on objectives, organization, analysis of work structure and work packages, scheduling and costing.

TEACHING AND LEARNING METHODS - ASSESSMENT											
TEACHING METHOD	In Class (Face to Face)										
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	• Use ICT in Teaching. • Support the learning process through the course's website. Notes and educational material, etc. • Useful links from Greek and European websites related to European Union policies, financial tools and programs.										
TEACHING ORGANIZATION <i>Describe in detail the way and methods of teaching:</i> Enhanced Lectures, Online Lectures, Seminars, Tutorial, Laboratory, Laboratory Exercise, Study & analysis of literature, Practice (Positioning), Interactive teaching, Developing a project, Individual / group work Telework (reference to tools)etc. <i>Details of the student's study hours for each learning activity and hours of non-guided study are shown to ensure that the total workload at the semester corresponds to the ECTS</i>	Lectures are supported by slide show. Emphasis is given to case studies and time planning applications. <table border="1"> <thead> <tr> <th>Activity</th><th>Student Workload (hours)</th></tr> </thead> <tbody> <tr> <td>Lectures</td><td>26</td></tr> <tr> <td>Case Studies</td><td>8</td></tr> <tr> <td>Independent Study</td><td>16</td></tr> <tr> <td>Total Course</td><td>50</td></tr> </tbody> </table>	Activity	Student Workload (hours)	Lectures	26	Case Studies	8	Independent Study	16	Total Course	50
Activity	Student Workload (hours)										
Lectures	26										
Case Studies	8										
Independent Study	16										
Total Course	50										

ASSESSMENT OF STUDENTS

Description of the assessment process

Assessment Methods, Formative or Concluding, Multiple Choice Test, Quick Response Questions, Test Development Questions, Problem Solving, Written Work, Report / Report, Oral Examination, Public Presentation, Laboratory Work, Other / Other Fully defined evaluation criteria are mentioned and if and where they are accessible to students.

Written final Examination which includes the following:

- Multiple choice questions
- Evaluation of theory
- Solving problems with quantitative data

LITERATURE AND STUDY MATERIALS / READING LIST

- Burke, R, .Management – Project Management. Planning and Control Techniques. Kritiki Publications, 2002.
- Dimitriadis, A ., Management - Project Management. New Technologies Publications, 2004.
- Polyzos, S, management and management of projects. Kritiki Publications, 2011.
- Maylor, H ., Project management. Klidarithmos Publications, 2005.
- Verzuh, E., Introduction to Project Management. Stamoulis Publications, 2002.
- Course notes.

H. ELECTIVE COURSES (ΠΜ)

INSTITUTION	NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS																			
SCHOOL	SCHOOL OF SCIENCE																			
DEPARTMENT	INFORMATICS AND TELECOMMUNICATIONS																			
COURSE LEVEL	UNDERGRADUATE																			
COURSE TITLE	Principles of Programming Languages																			
COURSE CODE	ΘΠ01	Semester	5	ECTS	6															
TEACHING HOURS per week	THEORY	3	SEMINAR.	1	LABORATORY															
COURSE TYPE	Select one of the following and delete the rest Track Compulsory (EYM) <table border="1"> <thead> <tr> <th>K</th><th>E1</th><th>E2</th><th>E3</th><th>E4</th><th>E5</th><th>E6</th></tr> </thead> <tbody> <tr> <td>A</td><td>B</td><td>B</td><td>E</td><td></td><td></td><td></td></tr> </tbody> </table> <i>Fill the table as in the curriculum: Track (A-Computer Science, B- Computer Engineering) / Specialization Compulsory (Y) / Core Specialization (B)/ Elective Specialization (E)</i>						K	E1	E2	E3	E4	E5	E6	A	B	B	E			
K	E1	E2	E3	E4	E5	E6														
A	B	B	E																	
URL	https://di.uoa.gr/~prondo/languages.html																			
EXPECTED PRIOR KNOWLEDGE/ PREREQUISITES AND PREPARATION:	K08																			
TEACHING AND EXAMINATIONS LANGUAGE:	GREEK																			
THE COURSE IS OFFERED TO ERASMUS STUDENTS	NO																			

COURSE CONTENT
The course covers basic and advanced techniques of the principles of programming languages that are needed in various branches of Computer Science. History of programming languages. Syntax and Semantics. Data types, scope, calling conventions, implementation of functions and procedures. Basic categories of programming languages: imperative, object-oriented, logic, functional, parallel. Program transformations and optimizations. Proving program correctness using Hoare logic. Lambda calculus: reductions, normal forms, Church-Rosser theorem, expressiveness, applications in programming languages. Typed lambda calculus. Theory of types and type checking.

STUDENT LEARNING OBJECTIVES

Teaching-Learning Goals-Expected Learning Outcomes

The goal of the class is for the student to acquire knowledge in the Theory of Computation that is necessary in computer science. Upon successful completion of the course the student will be able to:

- Distinguish the different categories of programming languages.
- Accurately define the syntax of a programming language.
- Accurately define the semantics of simple constructs of a programming language.
- Prove that a program is correct.
- Implement problems in functional and logic programming.

TEACHING AND LEARNING METHODS - ASSESSMENT

TEACHING METHOD	In Class (Face to Face)																			
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	Learning process supported by the web-page of the course (Teaching material; Announcements; Task assignments; Outside links, etc) Email communication. There exists a possibility of lecture transmission.																			
TEACHING ORGANIZATION	<table><thead><tr><th>Activity</th><th>Student Workload (hours)</th></tr></thead><tbody><tr><td>Lectures</td><td>52</td></tr><tr><td>Seminars</td><td>13</td></tr><tr><td>Preparation for seminars</td><td>15</td></tr><tr><td>Study and analysis of the literature</td><td>15</td></tr><tr><td>Preparation for the next lecture</td><td>13</td></tr><tr><td>Homework assignments</td><td>12</td></tr><tr><td>Independent Study</td><td>30</td></tr><tr><td>Total Course (25 hours of workload per unit of credit)</td><td>150</td></tr></tbody></table>		Activity	Student Workload (hours)	Lectures	52	Seminars	13	Preparation for seminars	15	Study and analysis of the literature	15	Preparation for the next lecture	13	Homework assignments	12	Independent Study	30	Total Course (25 hours of workload per unit of credit)	150
Activity	Student Workload (hours)																			
Lectures	52																			
Seminars	13																			
Preparation for seminars	15																			
Study and analysis of the literature	15																			
Preparation for the next lecture	13																			
Homework assignments	12																			
Independent Study	30																			
Total Course (25 hours of workload per unit of credit)	150																			
<i>Describe in detail the way and methods of teaching:</i> Enhanced Lectures, Online Lectures, Seminars, Tutorial, Laboratory, Laboratory Exercise, Study & analysis of literature, Practice (Positioning), Interactive teaching, Developing a project, Individual / group work Telework (reference to tools) etc. <i>Details of the student's study hours for each learning activity and hours of non-guided study are shown to ensure that the total workload at the semester corresponds to the ECTS</i>	Lectures are supported by transparencies. The board is also used extensively. An emphasis is placed both during the lectures and the seminars on problem solving. Homework assignments are individual or in groups of 2.																			

ASSESSMENT OF STUDENTS

Description of the assessment process

Assessment Methods, Formative or Concluding, Multiple Choice Test, Quick Response Questions, Test Development Questions, Problem Solving, Written Work, Report / Report, Oral Examination, Public Presentation, Laboratory Work, Other / Other

Fully defined evaluation criteria are mentioned and if and where they are accessible to students.

Assessment methods	Number	Percentage
Written examination	1	70%
Homeworks	2	30%

Evaluation by written examination and homework assignments.
Grade Feedback is available upon request.

LITERATURE AND STUDY MATERIALS / READING LIST

Basic textbooks in Greek: M. Scott, Pragmatics of Programming Languages, Kleidarithmos editions, Athens 2008.

- Adam Brooks Webber, Modern Programming Languages: A Practical Introduction, Crete University Press, 2009.
- P. Stamatopoulos, Logic and Functional Programming, 2016.
- N. Papaspyrou and P. Rondogiannis, Principles of Programming Languages (notes).

Additionally, the students have access to transparencies by P. Rondogiannis, and recommended literature in English.

INSTITUTION	NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS																			
SCHOOL	SCHOOL OF SCIENCE																			
DEPARTMENT	INFORMATICS AND TELECOMMUNICATIONS																			
COURSE LEVEL	UNDERGRADUATE																			
COURSE TITLE	Computer Graphics I																			
COURSE CODE	ΘΠ02	Semester	5	ECTS	6															
TEACHING HOURS per week	THEORY	3	SEMINAR.		LABORATORY	1														
COURSE TYPE	Select one of the following and delete the rest Electives (ΠΜ) <table border="1"> <thead> <tr> <th>K</th><th>E1</th><th>E2</th><th>E3</th><th>E4</th><th>E5</th><th>E6</th></tr> </thead> <tbody> <tr> <td>A B</td><td>B</td><td></td><td></td><td>E</td><td></td><td>B</td></tr> </tbody> </table> <i>Fill the table as in the curriculum: Track (A-Computer Science, B- Computer Engineering) / Specialization Compulsory (Y) / Core Specialization (B)/ Elective Specialization (E)</i>						K	E1	E2	E3	E4	E5	E6	A B	B			E		B
K	E1	E2	E3	E4	E5	E6														
A B	B			E		B														
URL	https://eclass.uoa.gr/courses/D35/																			
EXPECTED PRIOR KNOWLEDGE/ PREREQUISITES AND PREPARATION:	K03 Linear Algebra																			
TEACHING AND EXAMINATIONS LANGUAGE:	GREEK																			
THE COURSE IS OFFERED TO ERASMUS STUDENTS	NO																			

COURSE CONTENT
Introduction: history, technology, applications of Computer Graphics. Mathematical curves and finite differences, rasterization algorithms for line segments, general polygons and triangles. Antialiasing with pre- and post-filtering. Affine transformations, 2D and 3D transformations, homogeneous coordinates, composite transformations. Examples of transformations. Viewing transformation. Scene graphs. 2D and 3D line and polygon clipping algorithms. Projections. Back face culling. Hidden surface elimination and the z-buffer algorithm. Basic illumination principles and algorithms. Colour representation models. OpenGL programming laboratories. A selection from the following: parametric curves and surfaces, texture mapping principles, animation principles.

STUDENT LEARNING OBJECTIVES

Expected Learning Outcomes

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

- Explain the main stages of the Graphics pipeline
- Mention and describe the main algorithms used in Computer Graphics
- Program graphics applications using OpenGL

TEACHING AND LEARNING METHODS - ASSESSMENT

TEACHING METHOD	In Class (Face to Face)																
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	Learning process supported by the e-class platform. Specifically: Course Description, Course Material Delivery (transparencies, OpenGL labs, in-class exercises etc), Announcements, Course Calendar, Exercise Announcement and Delivery, Discussion groups for labs and exercises, External Links. Email communication Live transmission of lectures Ability to track recorded lectures OpenGL laboratory sessions																
TEACHING ORGANIZATION <i>Describe in detail the way and methods of teaching:</i> Enhanced Lectures, Online Lectures, Seminars, Tutorial, Laboratory, Laboratory Exercise, Study & analysis of literature, Practice (Positioning), Interactive teaching, Developing a project, Individual / group work Telework (reference to tools) etc. <i>Details of the student's study hours for each learning activity and hours of non-guided study are shown to ensure that the total workload at the semester corresponds to the ECTS</i>	The theory part is presented using transparencies, the blackboard for involved issues and in-class exercises. The OpenGL programming platform is learned via a series of laboratory sessions. An OpenGL exercises is given to groups of 1 to 2 students. The exercise and labs are supported via eclass discussion groups. <table> <tr> <th>Activity</th><th>Student Workload (hours)</th></tr> <tr> <td>Lectures</td><td>39</td></tr> <tr> <td>Regular Self-Study for theory part</td><td>31</td></tr> <tr> <td>OpenGL Laboratory Sessions (physical presence)</td><td>10</td></tr> <tr> <td>OpenGL Self-Study</td><td>20</td></tr> <tr> <td>OpenGL Exercise (groups of 1-2)</td><td>30</td></tr> <tr> <td>Self-Study for Final exam</td><td>20</td></tr> <tr> <td>Total Course</td><td>150</td></tr> </table>	Activity	Student Workload (hours)	Lectures	39	Regular Self-Study for theory part	31	OpenGL Laboratory Sessions (physical presence)	10	OpenGL Self-Study	20	OpenGL Exercise (groups of 1-2)	30	Self-Study for Final exam	20	Total Course	150
Activity	Student Workload (hours)																
Lectures	39																
Regular Self-Study for theory part	31																
OpenGL Laboratory Sessions (physical presence)	10																
OpenGL Self-Study	20																
OpenGL Exercise (groups of 1-2)	30																
Self-Study for Final exam	20																
Total Course	150																

ASSESSMENT OF STUDENTS

Description of the assessment process

Assessment Methods, Formative or Concluding, Multiple Choice Test, Quick Response Questions, Test Development Questions, Problem Solving, Written Work, Report / Report, Oral Examination, Public Presentation, Laboratory Work, Other / Other

Fully defined evaluation criteria are mentioned and if and where they are accessible to students.

The students are assessed based on a written examination and the OpenGL exercise. The written examination covers the theory part while the exercise covers the programming part. The exercise is assessed based on a set of criteria that are announced at the outset. There exists a complaints and remarking process.

Assessment methods	Number	Percentage
Written examination	1	66.66%
Final exercise	1	33.33%

LITERATURE AND STUDY MATERIALS / READING LIST

Basic textbook: Theoharis T., Papaioannou G., Platis N. Patriakalakis N.M., "Graphics & Visualization: principles and algorithms", English edition by CRC Press (2008). Greek edition by Symmetria (2010). Book website: <http://graphics.cs.aueb.gr/cgvizbook/>

Auxiliary textbook: Theoharis T., Boehm A., "Graphics: principles and algorithms", (in Greek), Symmetria 1999.

Notes and transparencies for OpenGL are distributed via the eclass platform.

INSTITUTION	NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS																			
SCHOOL	SCHOOL OF SCIENCE																			
DEPARTMENT	INFORMATICS AND TELECOMMUNICATIONS																			
COURSE LEVEL	UNDERGRADUATE																			
COURSE TITLE	Artificial Intelligence																			
COURSE CODE	ΥΣ02	Semester	5	ECTS	6															
TEACHING HOURS per week	THEORY	3	SEMINAR.	1	LABORATORY															
COURSE TYPE	Select one of the following and delete the rest Electives (ΠΜ) <table border="1"> <thead> <tr> <th>K</th><th>E1</th><th>E2</th><th>E3</th><th>E4</th><th>E5</th><th>E6</th></tr> </thead> <tbody> <tr> <td>A</td><td>E</td><td>B</td><td>B</td><td></td><td></td><td></td></tr> </tbody> </table> <i>Fill the table as in the curriculum: Track (A-Computer Science, B- Computer Engineering) / Specialization Compulsory (Y) / Core Specialization (B)/ Elective Specialization (E)</i>						K	E1	E2	E3	E4	E5	E6	A	E	B	B			
K	E1	E2	E3	E4	E5	E6														
A	E	B	B																	
URL	http://cgi.di.uoa.gr/~ys02																			
EXPECTED PRIOR KNOWLEDGE/ PREREQUISITES AND PREPARATION:	Data Structures (K08)																			
TEACHING AND EXAMINATIONS LANGUAGE:	GREEK																			
THE COURSE IS OFFERED TO ERASMUS STUDENTS	YES																			

COURSE CONTENT
Artificial Intelligence. Intelligent Agents. Solving problems with search agents. Search strategies: breadth-first search, uniform-cost search, depth-first search, depth-limited search, iterative deepening depth-first search, bi-directional search. Heuristic search strategies: greedy best-first search, A*-search. Local search. Constraint satisfaction problems and algorithms.

Knowledge-based Agents. Propositional logic and first-order logic. Using propositional logic and first-order logic to represent knowledge. Knowledge bases and ontologies. Examples from applications. Inference. Modus ponens, unification, forward and backward chairing, resolution. Introduction to logic programming and the language Prolog.

STUDENT LEARNING OBJECTIVES

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

- model and solve real-world problems using heuristic search
- model and solve real-world problems using constraint satisfaction algorithms
- model and solve real-world problems using local search
- represent knowledge in propositional and first order logic
- compute inferences using inference rules such as modus ponens or resolution

TEACHING AND LEARNING METHODS - ASSESSMENT

TEACHING METHOD

In Class (Face to Face)

USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES

Email communication
Live transmission of lectures
Ability to track recorded lectures
Utilization of educational platform <https://piazza.com> for answering student questions and announcements

TEACHING ORGANIZATION

Describe in detail the way and methods of teaching:
Enhanced Lectures,
Online Lectures,
Seminars,
Tutorial,
Laboratory,
Laboratory Exercise,
Study & analysis of literature,
Practice (Positioning),
Interactive teaching,
Developing a project,
Individual / group work
Telework (reference to tools) etc.

Activity	Student Workload (hours)
Lectures	39
Tutorial	13
Preparation for next lecture	13
Individual exercises	55
Preparation for final exams	30
Total Course (25 hours of workload per unit of credit)	150

Details of the student's study hours for each learning activity and hours of non-guided study are shown to ensure that the total workload at the semester corresponds to the ECTS

ASSESSMENT OF STUDENTS

Description of the assessment process

Assessment Methods, Formative or Concluding, Multiple Choice Test, Quick Response Questions, Test Development Questions, Problem Solving, Written Work, Report / Report, Oral Examination, Public Presentation, Laboratory Work, Other / Other

Fully defined evaluation criteria are mentioned and if and where they are accessible to students.

Describe explicitly methods, evaluation tools and provided feedback.

The table below is supplemented accordingly.

Assessment methods	Number	Percentage
Written examination	1	20%
Exercises	4	80%

LITERATURE AND STUDY MATERIALS / READING LIST

- Stuart Russel and Peter Norvig. Artificial Intelligence: A Modern Approach, Prentice Hall, 2nd edition (2003). <http://aima.cs.berkeley.edu/>.
- I. Vlahavas et. al Artificial Intelligence <http://aibook.csd.auth.gr>
- Slides from lectures based on the Russel and Norvig book.
- Relevant material from the Web page of the course

INSTITUTION	NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS																			
SCHOOL	SCHOOL OF SCIENCE																			
DEPARTMENT	INFORMATICS AND TELECOMMUNICATIONS																			
COURSE LEVEL	UNDERGRADUATE																			
COURSE TITLE	Parallel Systems																			
COURSE CODE	ΘΠ04	Semester	5	ECTS	6															
TEACHING HOURS per week	THEORY	3	SEMINAR.	1	LABORATORY															
COURSE TYPE	Select one of the following and delete the rest Elective (ΠΜ) <table border="1"> <thead> <tr> <th>K</th><th>E1</th><th>E2</th><th>E3</th><th>E4</th><th>E5</th><th>E6</th></tr> </thead> <tbody> <tr> <td>A-B</td><td></td><td>E</td><td>B</td><td>B</td><td></td><td></td></tr> </tbody> </table> <i>Fill the table as in the curriculum: Track (A-Computer Science, B- Computer Engineering) / Specialization Compulsory (Y) / Core Specialization (B)/ Elective Specialization (E)</i>						K	E1	E2	E3	E4	E5	E6	A-B		E	B	B		
K	E1	E2	E3	E4	E5	E6														
A-B		E	B	B																
URL	https://eclass.uoa.gr/courses/D36/																			
EXPECTED PRIOR KNOWLEDGE/ PREREQUISITES AND PREPARATION:	Recommended K14 Architecture I																			
TEACHING AND EXAMINATIONS LANGUAGE:	GREEK																			
THE COURSE IS OFFERED TO ERASMUS STUDENTS	NO																			

COURSE CONTENT
Covers the spectrum parallel architectures, parallel APIs, parallel application development and evaluation. Presents Flynn Classification and elaboration on MIMD architectures shared (UMA, NUMA, cc-NUMA) and distributed memory. GPUs as HPC. Measures of speed-up, efficiency, cost, Amdahl and Gustafson Laws. Foster design methodology, data and domain parallelism. Parallel programming APIs MPI, openMp, CUDA and hybrid combinations. Parallel Programming techniques for HPC applications. Profiling tools for evaluating and improving performance.

STUDENT LEARNING OBJECTIVES
Upon successful completion of the course the student will be able to: Classify architectures according to Flynn. Identify MIMD shared memory (UMA, NUMA, cc-NUMA) and distributed memory architectures.

- Define measures of speed-up, efficiency, cost and scalability as criteria of performance.
- Explain and apply Amdahl and Gustafson laws.
- Design, develop and evaluate parallel applications in MPI, OpenMp, CUDA and their hybrid combinations.
- Execute and debug parallel applications on HPC clusters
- Use profiling tools for improving application performance.

TEACHING AND LEARNING METHODS - ASSESSMENT																						
TEACHING METHOD	In Class (Face to Face)																					
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	Learning process supported by the e-class platform (specify which specific tools you use, eg Teaching material; Discussions on project, laboratories, etc; Announcements; Task assignments; Student groups) Email communication Live transmission of lectures Ability to track recorded lectures Programming Seminars																					
TEACHING ORGANIZATION	Describe in detail the way and methods of teaching: Enhanced Lectures, Online Lectures, Seminars, Tutorial, Laboratory, Laboratory Exercise, Study & analysis of literature, Practice (Positioning), Interactive teaching, Developing a project, Individual / group work Telework (reference to tools) etc. Details of the student's study hours for each learning activity and hours of non-guided study are shown to ensure that the total workload at the semester corresponds to the ECTS <table><thead><tr><th>Activity</th><th>Student Workload (hours)</th></tr></thead><tbody><tr><td>Lectures</td><td>39</td></tr><tr><td>Seminars</td><td>13</td></tr><tr><td>Study MPI Laboratory</td><td>15</td></tr><tr><td>Study OpenMp Laboratory</td><td>10</td></tr><tr><td>Study CUDA Laboratory</td><td>10</td></tr><tr><td>Tools</td><td>8</td></tr><tr><td>Programming Assignment</td><td>35</td></tr><tr><td>Independent Study</td><td>20</td></tr><tr><td>Total Course (25 hours of workload per unit of credit)</td><td>150</td></tr></tbody></table>		Activity	Student Workload (hours)	Lectures	39	Seminars	13	Study MPI Laboratory	15	Study OpenMp Laboratory	10	Study CUDA Laboratory	10	Tools	8	Programming Assignment	35	Independent Study	20	Total Course (25 hours of workload per unit of credit)	150
Activity	Student Workload (hours)																					
Lectures	39																					
Seminars	13																					
Study MPI Laboratory	15																					
Study OpenMp Laboratory	10																					
Study CUDA Laboratory	10																					
Tools	8																					
Programming Assignment	35																					
Independent Study	20																					
Total Course (25 hours of workload per unit of credit)	150																					
ASSESSMENT OF STUDENTS	Description of the assessment process Assessment Methods, Formative or Concluding, Multiple Choice Test, Quick Response Questions, Test Development Questions, Problem Solving, Written Work, Report / Report, Oral Examination, Public Presentation, Laboratory Work, Other / Other Fully defined evaluation criteria are mentioned and if and where they are accessible to students. Evaluation of theory by written examination and programming by a project (teams of 2-3). Grade Feedback is given in the written examination at the level of questions. In the project a rubric is given and feedback is provided accordingly with explanations in case of missing grades. <table><thead><tr><th>Assessment methods</th><th>Number</th><th>Percentage</th></tr></thead><tbody><tr><td>Written examination</td><td>1</td><td>30%</td></tr><tr><td>Final work</td><td>1</td><td>70%</td></tr></tbody></table>		Assessment methods	Number	Percentage	Written examination	1	30%	Final work	1	70%											
Assessment methods	Number	Percentage																				
Written examination	1	30%																				
Final work	1	70%																				

LITERATURE AND STUDY MATERIALS / READING LIST

Basic Book Peter S. Pacheco, Introduction to Parallel Programming (Greek edition)

Supportive Book Drimakopoulos V parallel systems and programming (on-line)

<http://hdl.handle.net/11419/3209>

Notes, presentaions, tutorials on Parallel programming and tools

INSTITUTION	NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS																			
SCHOOL	SCHOOL OF SCIENCE																			
DEPARTMENT	INFORMATICS AND TELECOMMUNICATIONS																			
COURSE LEVEL	UNDERGRADUATE																			
COURSE TITLE	Advanced Topics on Algorithms																			
COURSE CODE	ΘΠ12		Semester	6	ECTS	6														
TEACHING HOURS per week	THEORY	3	SEMINAR	1	LABORATORY															
COURSE TYPE	Select one of the following and delete the rest Electives (ΠΜ) <table border="1"> <tr> <td>K</td><td>E1</td><td>E2</td><td>E3</td><td>E4</td><td>E5</td><td>E6</td></tr> <tr> <td>A</td><td>B</td><td></td><td></td><td></td><td></td><td></td></tr> </table>						K	E1	E2	E3	E4	E5	E6	A	B					
K	E1	E2	E3	E4	E5	E6														
A	B																			
URL	https://eclass.uoa.gr/courses/DI457/																			
EXPECTED PRIOR KNOWLEDGE/ PREREQUISITES AND PREPARATION:	K17 Algorithms and Complexity																			
TEACHING AND EXAMINATIONS LANGUAGE:	GREEK																			
THE COURSE IS OFFERED TO ERASMUS STUDENTS	NO																			

COURSE CONTENT
Approximation Algorithms: Greedy Algorithms, Pricing Method, Linear Programming and Rounding, Polynomial Time Approximation Schemes. Randomized Algorithms: Monte Carlo Algorithms, Las Vegas Algorithms, Randomized Divide and Conquer. Parameterized Algorithms: Bounded Search Trees, Kernelization, Iterative Compression. Online Algorithms: Introductory problems, Marking Algorithms

STUDENT LEARNING OBJECTIVES

Teaching-Learning Goals-Expected Learning Outcomes

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

- Devise and analyze algorithm for Optimization Problems, Parameterized Problems and Online Problems.
- Implement advanced algorithm design techniques.
- Write rigorously mathematical proofs concerning the correctness of the algorithms and their analysis.

TEACHING AND LEARNING METHODS - ASSESSMENT

TEACHING METHOD	In Class (Face to Face)																
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	Learning process supported by the e-class platform (Teaching material; Announcements; Task assignments; Outside links etc) Email communication.																
TEACHING ORGANIZATION <i>Describe in detail the way and methods of teaching:</i> Enhanced Lectures, Online Lectures, Seminars, Tutorial, Laboratory, Laboratory Exercise, Study & analysis of literature, Practice (Positioning), Interactive teaching, Developing a project, Individual / group work Telework (reference to tools) etc. <i>Details of the student's study hours for each learning activity and hours of non-guided study are shown to ensure that the total workload at the semester corresponds to the ECTS</i>	<table><tr><th>Activity</th><th>Student Workload (hours)</th></tr><tr><td>Lectures (physical presence)</td><td>39</td></tr><tr><td>Seminars (physical presence)</td><td>13</td></tr><tr><td>Independent study and analysis of literature</td><td>70</td></tr><tr><td>Seminary preparation</td><td>13</td></tr><tr><td>Homeworks</td><td>15</td></tr><tr><td></td><td></td></tr><tr><td>Total Course (25 hours of workload per unit of credit)</td><td>150</td></tr></table> Extensive use of the blackboard. Emphasis is placed on examples and problem solving. Homeworks are individual or in groups of 3.	Activity	Student Workload (hours)	Lectures (physical presence)	39	Seminars (physical presence)	13	Independent study and analysis of literature	70	Seminary preparation	13	Homeworks	15			Total Course (25 hours of workload per unit of credit)	150
Activity	Student Workload (hours)																
Lectures (physical presence)	39																
Seminars (physical presence)	13																
Independent study and analysis of literature	70																
Seminary preparation	13																
Homeworks	15																
Total Course (25 hours of workload per unit of credit)	150																
ASSESSMENT OF STUDENTS <i>Description of the assessment process</i> Assessment Methods, Formative or Concluding, Multiple Choice Test, Quick Response Questions, Test Development Questions, Problem Solving, Written Work, Report / Report, Oral Examination, Public Presentation, Laboratory Work, Other / Other <i>Fully defined evaluation criteria are mentioned and if and where they are accessible to students.</i>	Evaluation by written examination and homework assignments. Grade Feedback is available upon request. <table><tr><th>Assessment methods</th><th>Number</th><th>Percentage</th></tr><tr><td>Written examination</td><td>1</td><td>60%</td></tr><tr><td>Exercises</td><td>3-4</td><td>40%</td></tr></table>	Assessment methods	Number	Percentage	Written examination	1	60%	Exercises	3-4	40%							
Assessment methods	Number	Percentage															
Written examination	1	60%															
Exercises	3-4	40%															

LITERATURE AND STUDY MATERIALS / READING LIST

- Kleinberg Jon, Tardos Eva: Σχεδιασμός Αλγορίθμων, Εκδόσεις Κλειδάριθμος 2008
- Cormen Thomas H., Leiserson Charles E., Rivest Ronald, Stein Clifford: Εισαγωγή στους Αλγορίθμους, Πανεπιστημιακές Εκδόσεις Κρήτης 2016
- Marek Cygan, Fedor V. Fomin, Łukasz Kowalik, Daniel Lokshtanov, Dániel Marx, Marcin Pilipczuk, Michał Pilipczuk, Saket Saurabh: Parameterized Algorithms, Springer 2015
- Vijay V. Vazirani: Approximation Algorithms, Springer 2001
- David P. Williamson, David B. Shmoys: The Design of Approximation Algorithms, Cambridge University Press 2011
- Michael Mitzenmacher, Eli Upfal: Probability and Computing: Randomized Algorithms and Probabilistic Analysis, Cambridge University Press 2005
- Rolf Niedermeier: Invitation to Fixed-Parameter Algorithms, Oxford University Press 2006
- Allan Borodin, Ran El-Yaniv: Online Computation and Competitive Analysis, Cambridge University Press 1998
- Christos H. Papadimitriou: Computational Complexity, Addison-Wesley 1993

INSTITUTION	NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS					
SCHOOL	SCHOOL OF SCIENCE					
DEPARTMENT	INFORMATICS AND TELECOMMUNICATIONS					
COURSE LEVEL	UNDERGRADUATE					
COURSE TITLE	Scientific Computing					
COURSE CODE	ΘΠ03	Semester	6	ECTS	6	
TEACHING HOURS per week	THEORY	3	SEMINAR.	1	LABORATORY	
COURSE TYPE	Track Compulsory (EYM)					
	K	E1	E2	E3	E4	E5
	A	B				E
URL	https://eclass.uoa.gr/courses/D34/					
EXPECTED PRIOR KNOWLEDGE/ PREREQUISITES AND PREPARATION:	Recommended compulsory K03 Linear Algebra					
TEACHING AND EXAMINATIONS LANGUAGE:	GREEK					
THE COURSE IS OFFERED TO ERASMUS STUDENTS	NO					

COURSE CONTENT
The course covers the design and analysis of numerical algorithms for Matrix computations. Matrix computations consist the core of problems in the Computational Science and Technology. In particular the syllabus of the course is the following • Error analysis for numerical computations. • Numerical solution of linear systems. Direct (Gaussian Elimination, Gauss-Jordan, LU Decomposition) and Iterative methods (SOR, SSOR, PSD, Semi-Iterative and Conjugate Gradient). • Numerical computation of Eigenvalues and Eigenvectors (Jacobi, Givens, LR, QR and Householder) • Least Squares Problem. • Numerical solution of Polynomial equations (Bernoulli, Quotient-Difference, Muller, Steffensen, Graffe's and Bairstow) and Non Linear systems of equations (Newton and Newton-SOR). • Introduction to the numerical solution of Partial Differential equations.

STUDENT LEARNING OBJECTIVES

Teaching-Learning Goals-Expected Learning Outcomes

To introduce students to the development and implementation of numerical algorithms for the solution of scientific problems.

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

- Develop and implement numerical algorithms for the solution of scientific problems
- Evaluate and compare the efficiency of the numerical algorithms
- Design and implement scientific software for the simulation of physical phenomena
- Implement numerical algorithms in MatLab/C

TEACHING AND LEARNING METHODS – ASSESSMENT

TEACHING METHOD	In Class (Face to Face)												
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	Learning process supported by the e-class platform. In particular, slide presentation of course and laboratory lectures, Discussions, Announcements, Task assignments and submissions, Student groups, Laboratory assignments, External Links of electronic books, notes, chapters, lectures, international Laboratories and Job announcements. Email communication Live transmission of lectures Ability to track recorded lectures												
TEACHING ORGANIZATION <i>Describe in detail the way and methods of teaching:</i> Enhanced Lectures, Online Lectures, Seminars, Tutorial, Laboratory, Laboratory Exercise, Study & analysis of literature, Practice (Positioning), Interactive teaching, Developing a project, Individual / group work Telework (reference to tools)etc.	The theory and the tutorials are presented by slides. Students are required to submit 4 individual assignments (design, development and evaluation of algorithms implemented in C and or MatLab. The students have the possibility of taking advice through discussions in eclass or during office hours. <table border="1"> <thead> <tr> <th>Activity</th><th>Student Workload (hours)</th></tr> </thead> <tbody> <tr> <td>Lectures</td><td>39</td></tr> <tr> <td>Tutorial</td><td>13</td></tr> <tr> <td>Individual Assignments</td><td>50</td></tr> <tr> <td>Independent Study</td><td>48</td></tr> <tr> <td>Total Course</td><td>150</td></tr> </tbody> </table> <i>Details of the student's study hours for each learning activity and hours of non-guided study are shown to ensure that the total workload at the semester corresponds to the ECTS</i>	Activity	Student Workload (hours)	Lectures	39	Tutorial	13	Individual Assignments	50	Independent Study	48	Total Course	150
Activity	Student Workload (hours)												
Lectures	39												
Tutorial	13												
Individual Assignments	50												
Independent Study	48												
Total Course	150												

ASSESSMENT OF STUDENTS

Description of the assessment process

Assessment Methods, Formative or Concluding, Multiple Choice Test, Quick Response Questions, Test Development Questions, Problem Solving, Written Work, Report / Report, Oral Examination, Public Presentation, Laboratory Work, Other / Other

Fully defined evaluation criteria are mentioned and if and where they are accessible to students.

The students are required to submit 4 individual assignments and take the final exam. The final exam is a problem solving type and covers the theoretical part of the course while the individual assignments require implementation of algorithms and cover the programming part. Students are eligible to access their written exam paper as well as their assignments and make comments on the evaluation.

Assessment methods	Number	Percentage
Written examination	1	80%
Individual Assignments	4	20%

LITERATURE AND STUDY MATERIALS / READING LIST

1. Gene H. Golub, Charles F. Van Loan, Theory and Matrix Computations, John Hopkins University Press, 2015 (translated in greek, Publ.).
2. Nikolaos Missirlis, Numerical Analysis : An algorithmic approach, Publication by National and Kapodistrian University of Athens, 2017.
<https://service.eudoxus.gr/search/#s/%CE%91%CF%81%CE%B9%CE%B8%CE%BC%CE%B7%CF%84%CE%B9%CE%BA%CE%AE%20%CE%91%CE%BD%CE%AC%CE%BB%CF%85%CF%83%CE%B7/0>

INSTITUTION	NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS																			
SCHOOL	SCHOOL OF SCIENCE																			
DEPARTMENT	INFORMATICS AND TELECOMMUNICATIONS																			
COURSE LEVEL	UNDERGRADUATE																			
COURSE TITLE	Logic Programming																			
COURSE CODE	ΥΣ05	Semester	6	ECTS	6															
TEACHING HOURS per week	THEORY	3	SEMINAR.	1	LABORATORY															
COURSE TYPE	Select one of the following and delete the rest Electives (ΠΜ) <table border="1"> <tr> <td>K</td><td>E1</td><td>E2</td><td>E3</td><td>E4</td><td>E5</td><td>E6</td></tr> <tr> <td>A</td><td></td><td>B</td><td>E</td><td></td><td></td><td></td></tr> </table>						K	E1	E2	E3	E4	E5	E6	A		B	E			
K	E1	E2	E3	E4	E5	E6														
A		B	E																	
URL	https://eclass.uoa.gr/courses/D51/																			
EXPECTED PRIOR KNOWLEDGE/ PREREQUISITES AND PREPARATION:	Recommended K08 – Data Structures																			
TEACHING AND EXAMINATIONS LANGUAGE:	GREEK																			
THE COURSE IS OFFERED TO ERASMUS STUDENTS	NO																			

COURSE CONTENT
Procedural and declarative programming. Logic programming as an instance of declarative programming. The Prolog programming language. Syntax of programs. Lists. Operators. Arithmetic. Control of backtracking. Negation in Prolog. Built-in predicates. Handling of data structures. Applications of Prolog in search problems, symbolic processing, natural language understanding and meta-programming. Expert systems and logic programming. Theory of logic programming. Interpretations and models. Model theoretic semantics. Fixpoint semantics. Unification. SLD-resolution. Operational semantics. Constraint logic programming. Implementation techniques of logic programming systems. Parallel logic programming. Logic programming for knowledge representation. Knowledge representation – methodologies and implementations using Prolog. Knowledge-based systems – the expert systems case. Deductive databases – the Datalog case. Logic programming and theWorld WideWeb.

STUDENT LEARNING OBJECTIVES

Expected Learning Outcomes

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

- Program in prolog using logic programming principles
- Program in constraint programming environments
- Explain what a specific logic program does
- Present the theory of logic programming
- Present the main ideas of the logic programming implementations
- Explain the behavior of a specific program in constraint logic programming
- Present the principles of knowledge representation and how logic programming can be used to represent knowledge

TEACHING AND LEARNING METHODS - ASSESSMENT

TEACHING METHOD	In Class (Face to Face)								
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	Learning process supported by web site page where all course material is uploaded as well as the course of the lectures Mailing list, Announcements, Task assignments, Email communication Ability to track recorded lectures								
TEACHING ORGANIZATION <i>Describe in detail the way and methods of teaching:</i> Enhanced Lectures, Online Lectures, Seminars, Tutorial, Laboratory, Laboratory Exercise, Study & analysis of literature, Practice (Positioning), Interactive teaching, Developing a project, Individual / group work Telework (reference to tools) etc. <i>Details of the student's study hours for each learning activity and hours of non-guided study are shown to ensure that the total workload at the semester corresponds to the ECTS</i>	During the lectures, slides are used as well as program code which is explained and executed to illustrate the theory. Any time during the semester, students can express any questions or views about the theory or the assignments into the course's mailing list. <table border="1"> <thead> <tr> <th>Activity</th><th>Student Workload (hours)</th></tr> </thead> <tbody> <tr> <td>Lectures + Tutorials</td><td>52</td></tr> <tr> <td>Individual exercises + Independent Study</td><td>98</td></tr> <tr> <td>Total Course</td><td>150</td></tr> </tbody> </table>	Activity	Student Workload (hours)	Lectures + Tutorials	52	Individual exercises + Independent Study	98	Total Course	150
Activity	Student Workload (hours)								
Lectures + Tutorials	52								
Individual exercises + Independent Study	98								
Total Course	150								

ASSESSMENT OF STUDENTS

Description of the assessment process

Assessment Methods, Formative or Concluding, Multiple Choice Test, Quick Response Questions, Test Development Questions, Problem Solving, Written Work, Report / Report, Oral Examination, Public Presentation, Laboratory Work, Other / Other

Fully defined evaluation criteria are mentioned and if and where they are accessible to students.

The requirements of the course consist of a written exam plus a sequence of practical work assignments submitted in the course of the semester. A pass mark should be reached in the written examination, in any case.

Assessment methods	Number	Percentage
Written examination	1	60%
Exercises	7	40%

LITERATURE AND STUDY MATERIALS / READING LIST

Panagiotis Stamatopoulos, Isambo Karali, "Logic Programming: Lecture Notes", 2011.
Panagiotis Stamatopoulos, "Logic and Functional Programming", Hellenic Academic Libraries Link, 2016.
<http://hdl.handle.net/11419/3587>.

INSTITUTION	NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS																			
SCHOOL	SCHOOL OF SCIENCE																			
DEPARTMENT	INFORMATICS AND TELECOMMUNICATIONS																			
COURSE LEVEL	UNDERGRADUATE																			
COURSE TITLE	Internet Application Technologies																			
COURSE CODE	ΥΣ14	Semester	6	ECTS	6															
TEACHING HOURS per week	THEORY	2	SEMINAR.	1	LABORATORY	1														
COURSE TYPE	Select one of the following and delete the rest Electives (ΠΜ) <table border="1"> <thead> <tr> <th>K</th><th>E1</th><th>E2</th><th>E3</th><th>E4</th><th>E5</th><th>E6</th></tr> </thead> <tbody> <tr> <td>A B</td><td></td><td></td><td>B</td><td></td><td>B</td><td></td></tr> </tbody> </table>						K	E1	E2	E3	E4	E5	E6	A B			B		B	
K	E1	E2	E3	E4	E5	E6														
A B			B		B															
URL	https://eclass.uoa.gr/courses/D53/																			
EXPECTED PRIOR KNOWLEDGE/ PREREQUISITES AND PREPARATION:	K10 Object-oriented programming																			
TEACHING AND EXAMINATIONS LANGUAGE:	GREEK																			
THE COURSE IS OFFERED TO ERASMUS STUDENTS	NO																			

COURSE CONTENT

The course focuses on the design and development of internet applications with emphasis on web applications. The course presents the architecture and the infrastructure of the World Wide Web as well as the architecture of client/server applications with emphasis on the architecture of multi-tier web applications. The covered topics include the following knowledge areas and technologies: Functionality of Web servers and browsers. HTTP protocol. HTML5/CSS languages. Javascript/Typescript languages. Relational Database Management Systems with internet access (MySQL) NoSQL database systems (MongoDB). Backend technologies: Servlets, RESTful Web Services, Object-relational mapping software frameworks, Connection Pooling. Frontend technologies: Javascript, Angular 5. Web Architectural Models (Model 1, Model-View Controller). Web Security (SSL/TLS, JSON Web Token). Programming Project: Design and Development of a complete Web Application including a subsystem for the provision of personalized recommendations.

STUDENT LEARNING OBJECTIVES

Expected Learning Outcomes

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

- Describe the functionality of web servers, web browsers and of the HTTP protocol.
- Describe the architecture and functionality of multi-tier internet applications with emphasis on web applications.
- Install and manage web servers (Apache Tomcat / TomEE) and RDBMS systems (MySQL).
- Program backend software components (Servlets, RESTful Web Services, Object-relational mapping components) with the Java programming language.
- Program web pages and frontend software components with HTML5, CSS, Javascript and Angular 5 languages.
- Design and develop web applications through the use of backend and frontend technologies.
- Utilize the data collected by web applications to develop a subsystem of personalized recommendations.

TEACHING AND LEARNING METHODS - ASSESSMENT											
TEACHING METHOD	In Class (Face to Face)										
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	Learning process supported by the e-class platform (Course description, Material Provision, Announcements, Calendar, Student Teams, Assignments, Discussion forum, External links) Email communication Live transmission of lectures Ability to track recorded lectures Utilization of Integrated Development Environments (IntelliJ Idea / Eclipse / Netbeans / MySQL Workbench).										
TEACHING ORGANIZATION	<i>Describe in detail the way and methods of teaching:</i> Enhanced Lectures, Online Lectures, Seminars, Tutorial, Laboratory, Laboratory Exercise, Study & analysis of literature, Practice (Positioning), Interactive teaching, Developing a project, Individual / group work Telework (reference to tools) etc. <i>Details of the student's study hours for each learning activity and hours of non-guided study are shown to ensure that the total workload at the semester corresponds to the ECTS</i> <table border="1"> <thead> <tr> <th>Activity</th><th>Student Workload (hours)</th></tr> </thead> <tbody> <tr> <td>Lectures</td><td>26</td></tr> <tr> <td>Tutorial</td><td>13</td></tr> <tr> <td>Laboratory</td><td>13</td></tr> <tr> <td>Project development (per person)</td><td>60</td></tr> </tbody> </table>	Activity	Student Workload (hours)	Lectures	26	Tutorial	13	Laboratory	13	Project development (per person)	60
Activity	Student Workload (hours)										
Lectures	26										
Tutorial	13										
Laboratory	13										
Project development (per person)	60										

	Study for the familiarization with web app technologies	20
	Study for the final written examination / Implementation of additional advanced requirements	18
	Total Course (25 hours of workload per unit of credit)	150
ASSESSMENT OF STUDENTS <i>Description of the assessment process</i> <i>Assessment Methods, Formative or Concluding, Multiple Choice Test, Quick Response Questions, Test Development Questions, Problem Solving, Written Work, Report / Report, Oral Examination, Public Presentation, Laboratory Work, Other / Other</i> <i>Fully defined evaluation criteria are mentioned and if and where they are accessible to students.</i>	Students are evaluated through a written examination and a programming project. Knowledge of the theoretical aspects of the course is assessed by the written examination. The programming aspects of the course are assessed through the programming project on the basis of graded criteria. Students are given the opportunity to request an analysis of their evaluation regarding both the written examination and the programming project. The evaluation is corrected in case of an error. Also, students have the possibility to be exempted from the written examination by implementing additional advanced requirements in the programming project.	
	Assessment methods	Number
	Written examination	1
	Project	2
		Percentage
		20%
		80%

LITERATURE AND STUDY MATERIALS / READING LIST
Official course textbooks (Eudoxos) 1. R. Connolly, R. Hoar, Web Programming, Μ. Γκιούρδας, 2015. 2. H.M. Deitel, P.J. Deitel, JAVA Programming, 10th edition, Εκδόσεις Μ. Γκιούρδας, 2015. Additional sources (in English): 1. L. Shklar, R. Rosen, Web Application Architecture: Principles, Protocols and Practices, 2nd Edition, Wiley, 2009. 2. N.S. Williams, Professional Java for Web Applications, Wrox, 2014. 3. Angular Development guise (https://angular.io/guide) Powerpoint / pdf presentations are provided for all the technologies taught in the course.

INSTITUTION	NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS					
SCHOOL	SCHOOL OF SCIENCE					
DEPARTMENT	INFORMATICS AND TELECOMMUNICATIONS					
COURSE LEVEL	UNDERGRADUATE					
COURSE TITLE	Electronics Laboratory					
COURSE CODE	K19ε	Semester	6	ECTS	6	
TEACHING HOURS per week	THEORY		SEMINAR.	1	LABORATORY	3
COURSE TYPE	Electives (ΠΜ)					
	K	E1	E2	E3	E4	E5
	B				B	E
URL	http://users.uoa.gr/~matakias/Links					
EXPECTED PRIOR KNOWLEDGE/ PREREQUISITES AND PREPARATION:	Circuits and Systems Laboratory K11e (ΕΡΓΑΣΤΗΡΙΟ ΚΥΚΛΩΜΑΤΩΝ ΚΑΙ ΣΥΣΤΗΜΑΤΩΝ K11ε)					
TEACHING AND EXAMINATIONS LANGUAGE:	GREEK					
THE COURSE IS OFFERED TO ERASMUS STUDENTS	NO					

COURSE CONTENT
The content of the Electronics Laboratory includes the followings: (i) Building blocks of simple Analog Circuits and use of Laboratory Instruments such as oscilloscope and Function Generator (ii) Diode Circuits, Forward and Reverse bias of diode, Voltage Regulation with diodes, DC and AC analysis, Circuit simulation with spice, Circuit analysis with Load Line (iii) Zener diode, Voltage regulation with Zener, Linear Power Supply design, Transformers and Rectification, Circuit simulation with spice (iv) Common Emitter Bipolar Transistor Circuit, DC Analysis, Load-Line solution of BJT circuits, Operating Point of Single transistor Amplifier, Low Frequency Common Emitter Amplifier, Gain and Output Resistance (v)) DC Analysis of Common Source MOSFET Circuit, Load-Line solution of nMOS circuit, Operating Point of Single nMOS Transistor Amplifier, Low Frequency Amplifier with nMOS Transistor (vi) CMOS inverter with nMOS and pMOS transistors, Buffer circuit, DC analysis, Simulation with spice

STUDENT LEARNING OBJECTIVES

Teaching-Learning Goals-Expected Learning Outcomes

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

- Explain the basic principles in simple analog circuits
- Design, construct and test simple analog circuits with diodes in the laboratory.
- Build and undertake measurements of simple transistor amplifier circuits.
- Analyze and explain the DC and AC behavior and operation of simple diode or transistor circuit.
- Demonstrate understanding of circuit analysis for bipolar and MOS single transistor circuits.
- Interpret diode and transistor datasheets and use them to aid the design of circuits.
- Use SPICE Simulation Tools to find solutions to simple analog circuit related problems.

TEACHING AND LEARNING METHODS - ASSESSMENT

TEACHING METHOD	In Class (Face to Face)														
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	Learning process supported by the e-class platform Use of the online course page: Course Description, Discussions Notes and Instructions, Announcements, Task assignments Email communication														
TEACHING ORGANIZATION	<i>Describe in detail the way and methods of teaching:</i> Enhanced Lectures, Online Lectures, Seminars, Tutorial, Laboratory, Laboratory Exercise, Study & analysis of literature, Practice (Positioning), Interactive teaching, Developing a project, Individual / group work Telework (reference to tools) etc. <i>Details of the student's study hours for each learning activity and hours of non-guided study are shown to ensure that the total workload at the semester corresponds to the ECTS</i> <table border="1"> <thead> <tr> <th>Activity</th><th>Student Workload (hours)</th></tr> </thead> <tbody> <tr> <td>Tutorial</td><td>13</td></tr> <tr> <td>Laboratory</td><td>39</td></tr> <tr> <td>Teamwork in a case study</td><td>13</td></tr> <tr> <td>Small individual exercises</td><td>52</td></tr> <tr> <td>Independent Study</td><td>33</td></tr> <tr> <td>Total Course (25 hours of workload per unit of credit)</td><td>150</td></tr> </tbody> </table>	Activity	Student Workload (hours)	Tutorial	13	Laboratory	39	Teamwork in a case study	13	Small individual exercises	52	Independent Study	33	Total Course (25 hours of workload per unit of credit)	150
Activity	Student Workload (hours)														
Tutorial	13														
Laboratory	39														
Teamwork in a case study	13														
Small individual exercises	52														
Independent Study	33														
Total Course (25 hours of workload per unit of credit)	150														

ASSESSMENT OF STUDENTS

Description of the assessment process

Assessment Methods, Formative or Concluding, Multiple Choice Test, Quick Response Questions, Test Development Questions, Problem Solving, Written Work, Report / Report, Oral Examination, Public Presentation, Laboratory Work, Other / Other

Fully defined evaluation criteria are mentioned and if and where they are accessible to students.

Describe explicitly methods, evaluation tools and provided feedback.

The table below is supplemented accordingly.

Assessment methods	Number	Percentage
Written examination	1	60%
Exercises	13	20%
Laboratory	13	20%

LITERATURE AND STUDY MATERIALS / READING LIST

1. Γιάννης Τσιβίδης, "Εισαγωγικό Εργαστήριο Κυκλωμάτων & Ηλεκτρονικής", εκδ. Παπασωτηρίου, Αθήνα 2018, ISBN:978-960-491-121-9 (Εύδοξος: 77117449).
 2. Make Electronics – Learning by Discovery, Charles Platt, Maker Media, Inc, 2009
 3. The Art of Electronics, Horowitz & Hill, Cambridge University Press; 2nd ed., 1989
 4. <http://www.allaboutcircuits.com>
- Lecture Notes and Work Sheets, <http://users.uoa.gr/~matakias/Links.html>

INSTITUTION	NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS																			
SCHOOL	SCHOOL OF SCIENCE																			
DEPARTMENT	INFORMATICS AND TELECOMMUNICATIONS																			
COURSE LEVEL	UNDERGRADUATE																			
COURSE TITLE	Stochastic Signals																			
COURSE CODE	EN07	Semester	6	ECTS	6															
TEACHING HOURS per week	THEORY	3	SEMINAR	1	LABORATORY															
COURSE TYPE	Select one of the following and delete the rest Elective(ΠΜ) <table border="1"> <tr> <td>K</td><td>E1</td><td>E2</td><td>E3</td><td>E4</td><td>E5</td><td>E6</td></tr> <tr> <td>B</td><td></td><td></td><td></td><td></td><td>B</td><td>B</td></tr> </table>						K	E1	E2	E3	E4	E5	E6	B					B	B
K	E1	E2	E3	E4	E5	E6														
B					B	B														
URL	https://eclass.uoa.gr/courses/DI461/																			
EXPECTED PRIOR KNOWLEDGE/ PREREQUISITES AND PREPARATION:	Signals and Systems (K11)																			
TEACHING AND EXAMINATIONS LANGUAGE:	GREEK																			
THE COURSE IS OFFERED TO ERASMUS STUDENTS	NO																			

COURSE CONTENT
The course focuses on stochastic signals / random processes covering the basic mathematical tools of their qualitative and quantitative characterization as well as their processing. In the first part of the course, an overview of basic concepts of linear algebra (norms, vector spaces, eigenvalues and eigenvectors of a matrix), probabilities (definitions and properties) and random variables (statistical functions and metrics, transformation of random variables, multiple random variables, correlation, orthogonality, well known distributions, estimators). In the second part of the course, we study random processes (power spectrum, stationarity, ergodicity), their time and frequency analysis (periodogram, filtering, principal component analysis, parametric methods AR, MA, ARMA), Wiener filters, Kalman filtering, and the reduced rank minimum variance filter as well as their applications (processing in noisy environments, linear prediction, system identification, multi-antenna systems) and basic adaptive filtering methods (steepest descent method as well as algorithms LMS, NLMS, and RLS). The course's theory and exercises contain example applications of the methods for analyzing and processing stochastic signals in fifth generation (5G) communications systems.

STUDENT LEARNING OBJECTIVES

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

- Define statistical functions and metrics of random variables as well as will known distributions of a marginal and multiple random variables.
- Distinguish the key estimators of the main statistical metrics.
- Calculate statistical functions of transformations of random variables.
- Define the basic properties of random processes.
- Develop methods of stochastic signal analysis: periodogram, filtering, principal component analysis, and parametric methods AR, MA, ARMA.
- Implement methods of stochastic signal analysis using embedded functions in well-known software packages for mathematical programming.
- Design the Wiener and Kalman filters, as well as the reduced rank minimum variance filter.
- Develop the basic adaptive filtering methods and recognize the suitability of their use in various applications of stochastic signal processing.

TEACHING AND LEARNING METHODS - ASSESSMENT		
TEACHING METHOD	In Class (Face to Face)	
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	Learning process supported by the e-class platform. More specifically: Course Description, Material Supply, Announcements, Calendar, Assignment and Submission of Exercises, Discussion on Exercises, Questionnaires, External Links) E-mail communication Live transmission of lectures Ability to follow recorded lectures	
TEACHING ORGANIZATION <i>Describe in detail the way and methods of teaching: Enhanced Lectures, Online Lectures, Seminars, Tutorial, Laboratory, Laboratory Exercise, Study & analysis of literature, Practice (Positioning), Interactive teaching, Developing a project, Individual / group work Telework (reference to tools)etc.</i> <i>Details of the student's study hours for each learning activity and hours of non-guided study are shown to ensure that the total workload at the semester corresponds to the ECTS</i>	Activity	Student Workload (hours)
	Lectures	39
	Seminars	13
	Two (2) Personalized Programming Exercises	14+14=28
	Independent Study	20
	Total Course (25 hours of workload per unit of credit)	100
	The course's lectures and seminars are given through slide show presentations. Two individual programming exercises (one for each part of the course) are given in order to embed the theory through the programming of taught methods of stochastic signal processing in Matlab or Python mathematical programming software. Support for the exercises is given via discussions in eclass.	

ASSESSMENT OF STUDENTS

Description of the assessment process

Assessment Methods, Formative or Concluding, Multiple Choice Test, Quick Response Questions, Test Development Questions, Problem Solving, Written Work, Report / Report, Oral Examination, Public Presentation, Laboratory Work, Other / Other

Fully defined evaluation criteria are mentioned and if and where they are accessible to students.

Students are assessed with two (2) compulsory individual exercises and one (1) final written examination. The written examination covers the theoretical part of the course, while the exercises are based on the programming of applications for understanding the theory. The exercises are evaluated with classified criteria and communicated to the students. Complaints and retrains are allowed.

Assessment methods	Number	Percentage
Personalized Programming Exercises	2	25%+25%=50%
Final work	1	50%

LITERATURE AND STUDY MATERIALS / READING LIST

1. «Statistical Signal Processing and Learning: Basic Definitions, Algorithms, and Models», D. Ambeliotis, C. Maurokefalidis, K. Berberidis, Kallipos, 2015. **(available online)**
2. «Principles of Communication Networks and Systems», N. Benvenuto and G. Cherubini, University of Patras, 2004. **(available online via ΕΥΔΟΞΟΣ)**

INSTITUTION	NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS					
SCHOOL	SCHOOL OF SCIENCE					
DEPARTMENT	INFORMATICS AND TELECOMMUNICATIONS					
COURSE LEVEL	UNDERGRADUATE					
COURSE TITLE	Algorithmic Operations Research					
COURSE CODE	ΘΠ09	Semester	7	ECTS	6	
TEACHING HOURS per week	THEORY	3	SEMINAR.	1	LABORATORY	
COURSE TYPE	Elective Specialization (ΠΜ)					
	K	E1	E2	E3	E4	E5
	A B	B	B	E		B
URL	https://eclass.uoa.gr/courses/D40/					
EXPECTED PRIOR KNOWLEDGE/ PREREQUISITES AND PREPARATION:	K17 Algorithms and Complexity					
TEACHING AND EXAMINATIONS LANGUAGE:	GREEK					
THE COURSE IS OFFERED TO ERASMUS STUDENTS	YES					

COURSE CONTENT
The course covers mathematical decision making models and presents algorithmic techniques for solving them. It focuses on Linear programming and the simplex algorithm, dual theory and transportation problems. In integer programming it describes branch and bound techniques for packing, covering and knapsack problems, and generalized linear programming for cutting stock problems. It describes techniques for algorithms evaluation (empirical evaluation, approximation ratio). It develops Local Search Algorithms and studies the Neighborhood Structure and Neighborhood search methods for the Traveling Salesman (k-OPT neighborhoods), max cut and graph bipartitioning problems .

STUDENT LEARNING OBJECTIVES
Teaching-Learning Goals-Expected Learning Outcomes Introduces students to key mathematical decision models and to algorithmic techniques to solve them. Upon successful completion of the course the student will be able to:

- formulate practical problems as linear, integer or mixed integer programming models
- recognize the difficulty of solving optimally some practical problems such as integer programming problems
- use suitable algorithmic resolution techniques for some models such as linear programming or transportation
- evaluate the performance of an algorithm and decide its suitability for solving a model
- mention and describe the characteristics of the algorithms: simplex, vogel, Reduced Costs, branch and bound, Local Search

TEACHING AND LEARNING METHODS - ASSESSMENT															
TEACHING METHOD	In Class (Face to Face)														
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	Learning process supported by the e-class platform: course description, provision of material, announcements, assignment and upload Contact via e-mail Live transmission of lectures Ability to track recorded lectures														
TEACHING ORGANIZATION <i>Describe in detail the way and methods of teaching:</i> Enhanced Lectures, Online Lectures, Seminars, Tutorial, Laboratory, Laboratory Exercise, Study & analysis of literature, Practice (Positioning), Interactive teaching, Developing a project, Individual / group work Telework (reference to tools) etc. <i>Details of the student's study hours for each learning activity and hours of non-guided study are shown to ensure that the total workload at the semester corresponds to the ECTS</i>	Use of slides in lectures. Support provided to familiarize with the GLPK package that solves large linear / integer programs. There are 2 individual assignments on modeling and the development of algorithmic techniques for NP-hard problems. <table> <tr> <th>Activity</th><th>Student Workload (hours)</th></tr> <tr> <td>Lectures (in class)</td><td>39</td></tr> <tr> <td>Tutorial (in class)</td><td>13</td></tr> <tr> <td>Assignment 1 (individual)</td><td>26</td></tr> <tr> <td>Assignment 2 (individual)</td><td>26</td></tr> <tr> <td>Final written exam</td><td>46</td></tr> <tr> <td>Total Course (25 hours of workload per unit of credit)</td><td>150</td></tr> </table>	Activity	Student Workload (hours)	Lectures (in class)	39	Tutorial (in class)	13	Assignment 1 (individual)	26	Assignment 2 (individual)	26	Final written exam	46	Total Course (25 hours of workload per unit of credit)	150
Activity	Student Workload (hours)														
Lectures (in class)	39														
Tutorial (in class)	13														
Assignment 1 (individual)	26														
Assignment 2 (individual)	26														
Final written exam	46														
Total Course (25 hours of workload per unit of credit)	150														

ASSESSMENT OF STUDENTS

Description of the assessment process

Assessment Methods, Formative or Concluding, Multiple Choice Test, Quick Response Questions, Test Development Questions, Problem Solving, Written Work, Report / Report, Oral Examination, Public Presentation, Laboratory Work, Other / Other

Fully defined evaluation criteria are mentioned and if and where they are accessible to students.

Students are assessed with 2 assignments and a final written examination

Assessment methods	Number	Percentage
Written examination	1	80%
Assignments	3	20%

Evaluation criteria are accessible to students through e-class

LITERATURE AND STUDY MATERIALS / READING LIST

- F.S. HILLIER and G.J. LIEBERMAN, *Introduction to Operations Research*, 8th ed., McGraw-Hill, New York, 2004
- Γιάννης Κολέτσος- Δ. Στογιάννης, *Εισαγωγή στην Επιχειρησιακή Έρευνα*, 3η Έκδοση, Εκδ. Συμεών., Κωδ. **50656312**, 2017 (Εύδοξος).
- Βασίλης Κώστογλου, *Επιχειρησιακή Έρευνα*, 2η Έκδοση, Εκδ. Τζιόλα, Κωδ. **50655958**, 2016 (Εύδοξος).
- Notes, *Algorithmic Operations Research*, 2016, 2d ed, Β. Ζησιμόπουλος
<https://eclass.uoa.gr/modules/document/index.php?course=D40&openDir=/4c2b3151ye79>
- Slides,
<https://eclass.uoa.gr/modules/document/index.php?course=D40&openDir=/59cab0d9gRUH>

INSTITUTION	NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS																			
SCHOOL	SCHOOL OF SCIENCE																			
DEPARTMENT	INFORMATICS AND TELECOMMUNICATIONS																			
COURSE LEVEL	UNDERGRADUATE																			
COURSE TITLE	Graph Theory																			
COURSE CODE	ΘΠ10	Semester	8	ECTS	6															
TEACHING HOURS per week	THEORY	3	SEMINAR.	1	LABORATORY															
COURSE TYPE	Select one of the following and delete the rest Electives (ΠΜ) <table border="1"> <thead> <tr> <th>K</th><th>E1</th><th>E2</th><th>E3</th><th>E4</th><th>E5</th><th>E6</th></tr> </thead> <tbody> <tr> <td>A-B</td><td>Y</td><td></td><td></td><td></td><td>Y</td><td></td></tr> </tbody> </table> Fill the table as in the curriculum: Track (A-Computer Science, B- Computer Engineering) / Specialization Compulsory (Y) / Core Specialization (B)/ Elective Specialization (E)						K	E1	E2	E3	E4	E5	E6	A-B	Y				Y	
K	E1	E2	E3	E4	E5	E6														
A-B	Y				Y															
URL	https://eclass.uoa.gr/courses/DI412/																			
EXPECTED PRIOR KNOWLEDGE/ PREREQUISITES AND PREPARATION:	K20α Mathematics for Computer Science																			
TEACHING AND EXAMINATIONS LANGUAGE:	GREEK																			
THE COURSE IS OFFERED TO ERASMUS STUDENTS	NO																			

COURSE CONTENT
Paths, trees. Vertex- and edge-separators, connectivity. Menger's Theorem. Matchings. Tutte's Theorem. Vertex Covers. Planarity, outer-planarity. Unique Embeddings. Whitney's Theorem. Pathwidth and Treewidth . Graph coloring. Brooks' Theorem. Mycielski's construction.

STUDENT LEARNING OBJECTIVES
Teaching-Learning Goals-Expected Learning Outcomes Upon successful completion of the course the student will be able to: • Solve basic graph problems. • Model problem inputs using graphs and their properties. • Express rigorously results on graphs.

- Write formal proofs on graphs.
- Classify graphs into one of the fundamental graph classes.

TEACHING AND LEARNING METHODS - ASSESSMENT																
TEACHING METHOD	In Class (Face to Face)															
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	Learning process supported by the e-class platform (Teaching material; Announcements; Task assignments; Outside links etc) Email communication. There exists a possibility of lecture transmission															
TEACHING ORGANIZATION <i>Describe in detail the way and methods of teaching: Enhanced Lectures, Online Lectures, Seminars, Tutorial, Laboratory, Laboratory Exercise, Study & analysis of literature, Practice (Positioning), Interactive teaching, Developing a project, Individual / group work Telework (reference to tools) etc.</i> <i>Details of the student's study hours for each learning activity and hours of non-guided study are shown to ensure that the total workload at the semester corresponds to the ECTS</i>	<table><tr><th>Activity</th><th>Student Workload (hours)</th></tr><tr><td>Lectures</td><td>39</td></tr><tr><td>Seminary</td><td>13</td></tr><tr><td>Independent study and analysis of literature</td><td>70</td></tr><tr><td>Seminary preparation</td><td>13</td></tr><tr><td>Homeworks</td><td>15</td></tr><tr><td>Total Course (25 hours of workload per unit of credit)</td><td>150</td></tr></table>	Activity	Student Workload (hours)	Lectures	39	Seminary	13	Independent study and analysis of literature	70	Seminary preparation	13	Homeworks	15	Total Course (25 hours of workload per unit of credit)	150	
	Activity	Student Workload (hours)														
Lectures	39															
Seminary	13															
Independent study and analysis of literature	70															
Seminary preparation	13															
Homeworks	15															
Total Course (25 hours of workload per unit of credit)	150															
	Extensive use of the blackboard. Emphasis is placed on examples and problem solving. Homeworks are individual or in groups of 2															
ASSESSMENT OF STUDENTS <i>Description of the assessment process</i> <i>Assessment Methods, Formative or Concluding, Multiple Choice Test, Quick Response Questions, Test Development Questions, Problem Solving, Written Work, Report / Report, Oral Examination, Public Presentation, Laboratory Work, Other / Other</i> <i>Fully defined evaluation criteria are mentioned and if and where they are accessible to students.</i>	<table><tr><td colspan="3">Evaluation by written examination and homework assignments. Grade Feedback is available upon request.</td></tr><tr><th>Assessment methods</th><th>Number</th><th>Percentage</th></tr><tr><td>Written examination</td><td>1</td><td>80%</td></tr><tr><td>Exercises</td><td>3-4</td><td>20%</td></tr></table>		Evaluation by written examination and homework assignments. Grade Feedback is available upon request.			Assessment methods	Number	Percentage	Written examination	1	80%	Exercises	3-4	20%		
	Evaluation by written examination and homework assignments. Grade Feedback is available upon request.															
Assessment methods	Number	Percentage														
Written examination	1	80%														
Exercises	3-4	20%														

LITERATURE AND STUDY MATERIALS / READING LIST
S. Kolliopoulos, Lecture Notes. Rheimard Diestel. Graph Theory, 5th Edition, Springer, 2016. Douglas B. West. Introduction to Graph Theory, 2nd Edition, Pearson, 2001 K.H. Rosen. Διακριτά Μαθηματικά και Εφαρμογές τους. 7η Έκδοση, Εκδόσεις Τζιόλα, 2015 (greek edition of K. H. Rosen's Discrete Mathematics and its applications.)



INSTITUTION	NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS									
SCHOOL	SCHOOL OF SCIENCE									
DEPARTMENT	INFORMATICS AND TELECOMMUNICATIONS									
COURSE LEVEL	UNDERGRADUATE									
COURSE TITLE	Advanced Scientific Computing									
COURSE CODE	ΘΠ18		Semester		7		ECTS		6	
TEACHING HOURS per week	THEORY		3		SEMINAR.		1		LABORATORY	
COURSE TYPE	Track Compulsory (EYM)									
	K		E1		E2		E3		E4	
	A		E							
URL	https://eclass.uoa.gr/courses/D185/									
EXPECTED PRIOR KNOWLEDGE/ PREREQUISITES AND PREPARATION:	Recommended Compulsory K15 Numerical Analysis									
TEACHING AND EXAMINATIONS LANGUAGE:	GREEK									
THE COURSE IS OFFERED TO ERASMUS STUDENTS	NO									

COURSE CONTENT
The subject of the course is quite broad for one semester since the area of Scientific Computing is developing very fast as it has a lot of applications in many sciences. Numerical simulation is a significant tool for the study of scientific problems which arise in sciences like Physics, Chemistry, Geology, Biology, Economics etc. Most of these problems end up with the solution of a system of Ordinary or Partial Differential equations which can only be solved numerically. The goal is the student to obtain the necessary knowledge in order to be able to develop not only the most efficient numerical algorithm but also its corresponding software for the study of scientific problems by simulation. The course covers the study of numerical solution methods for Ordinary and Partial Differential equations which consist the core of the Scientific Computations. Special emphasis is given on the practical application. In particular the syllabus consists of the following: Part I Numerical methods for the solution of Ordinary Differential Equations : methods of Euler, Taylor, Truncation and roundoff errors, Consistency, Convergence and Stability. Second, third and fourth order Runge – Kutta methods, Errors and Stability. Multiple step methods: Adams-Bashforth, Predictor-Corrector, Consistency, Convergence and Stiffness. Boundary Value Problems : Method of finite differences.

Part II Introduction to finite differences. Numerical solution of Parabolic Equations : One dimensional Parabolic equations, Direct methods, Crank-Nicolson, Convergence, Stability. Two dimensional Parabolic equations : Direct methods, Iterative methods (ADI). Three dimensional Parabolic equations. Numerical solution of Elliptic equations : Iterative methods (SOR, SSOR). Numerical solution of Hyperbolic equations : Direct and Iterative methods.

STUDENT LEARNING OBJECTIVES

Teaching-Learning Goals-Expected Learning Outcomes

To introduce students to the development and implementation of numerical algorithms for the solution of ordinary and partial differential equations.

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

- Design and develop a numerical algorithm for an initial or a boundary value problem which involves an ordinary or a partial differential equation
- Evaluate and compare the efficiency of two different algorithms for the numerical solution of the same problem
- Develop scientific software for the simulation of physical phenomena

TEACHING AND LEARNING METHODS - ASSESSMENT

TEACHING METHOD

In Class (Face to Face)

USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES

Learning process supported by the e-class platform. In particular, slide presentation of course and laboratory lectures, Discussions, Announcements, Task assignments and submissions, Student groups, Laboratory assignments, External Links of electronic books, notes, chapters, lectures, international Laboratories and Job announcements.

Email communication

Live transmission of lectures

Ability to track recorded lectures

<http://opencourses.uoa.gr/courses/DI108/>

TEACHING ORGANIZATION

Describe in detail the way and methods of teaching:

Enhanced Lectures,
Online Lectures,
Seminars,
Tutorial,
Laboratory,
Laboratory Exercise,
Study & analysis of literature,
Practice (Positioning),
Interactive teaching,
Developing a project,
Individual / group work
Telework (reference to tools)etc.

The theory and the tutorials are presented by slides.

Students are required to submit 4 individual assignments which require the design, development and evaluation of algorithms implemented in C and /or MatLab. The students have the possibility of taking advice through discussions in eclass or during office hours.

Activity	Student Workload (hours)
Lectures	39

<i>Details of the student's study hours for each learning activity and hours of non-guided study are shown to ensure that the total workload at the semester corresponds to the ECTS</i>	Tutorial	13
	individual assignments	50
	Independent Study	48
	Total Course	150
ASSESSMENT OF STUDENTS <i>Description of the assessment process</i> <i>Assessment Methods, Formative or Concluding, Multiple Choice Test, Quick Response Questions, Test Development Questions, Problem Solving, Written Work, Report / Report, Oral Examination, Public Presentation, Laboratory Work, Other / Other</i> <i>Fully defined evaluation criteria are mentioned and if and where they are accessible to students.</i>	The students are required to submit 4 individual assignments and take the final exam. The final exam is a problem solving type and covers the theoretical part of the course while the individual assignments require implementation of algorithms and cover the programming part. Students are eligible to access their written exam paper as well as their assignments and make comments on the evaluation.	
	Assessment methods	Number
	Written examination	1
	Individual assignments	4
		Percentage
		80%
		20%

LITERATURE AND STUDY MATERIALS / READING LIST
3. M. Vraxatis, Numerical Analysis : Ordinary Differential Equations, Kleidarithmos, 2012. https://service.eudoxus.gr/search/#s/%CE%92%CF%81%CE%B1%CF%87%CE%B1%CF%84%CE%B7%CF%82/0 4. Nikolaos Missirlis, Numerical Analysis : An algorithmic approach, Publication by National and Kapodistrian University of Athens, 2017. https://service.eudoxus.gr/search/#s/%CE%91%CF%81%CE%B9%CE%B8%CE%BC%CE%B7%CF%84%CE%B9%CE%BA%CE%AE%20%CE%91%CE%BD%CE%AC%CE%BB%CF%85%CF%83%CE%B7/0

INSTITUTION	NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS																			
SCHOOL	SCHOOL OF SCIENCE																			
DEPARTMENT	INFORMATICS AND TELECOMMUNICATIONS																			
COURSE LEVEL	UNDERGRADUATE																			
COURSE TITLE	Human-Computer Interaction																			
COURSE CODE	ΥΣ08	Semester	7	ECTS	6															
TEACHING HOURS per week	THEORY	3	SEMINAR.	1	LABORATORY	0														
COURSE TYPE	Select one of the following and delete the rest Elective (ΠΜ) <table border="1"> <thead> <tr> <th>K</th><th>E1</th><th>E2</th><th>E3</th><th>E4</th><th>E5</th><th>E6</th></tr> </thead> <tbody> <tr> <td>A</td><td></td><td>B</td><td>B</td><td></td><td>E</td><td>E</td></tr> </tbody> </table>						K	E1	E2	E3	E4	E5	E6	A		B	B		E	E
K	E1	E2	E3	E4	E5	E6														
A		B	B		E	E														
URL	https://eclass.uoa.gr/courses/D54/																			
EXPECTED PRIOR KNOWLEDGE/ PREREQUISITES AND PREPARATION:	Prerequisite K29 Design and Use of Database Systems																			
TEACHING AND EXAMINATIONS LANGUAGE:	GREEK																			
THE COURSE IS OFFERED TO ERASMUS STUDENTS	NO																			

COURSE CONTENT
The course covers the principles of human-computer interaction and the user-centered design, development and evaluation of user interfaces. Specifically, topics include an overview of human information processing subsystems (visual, aural and tactile perception, memory, attention, and problem solving); the Gestalt principles; metaphors and analogies; predictive models for interface design (GOMS, KLM); interaction design concepts and elements (e.g. Fitts' Law); human factors and ergonomics; basic concepts in heuristic evaluation with known heuristics (e.g. by Nielsen); user centered iterative design life cycle: personas, user needs analysis and functional specifications Hierarchical Task Analysis, low and high fidelity prototyping, wireframes, storyboards; Usability engineering and usability evaluation techniques; User interface development tools and frameworks: HTML, Javascript, PHP. Information Visualization; Future and innovative interfaces such as virtual and augmented reality.

STUDENT LEARNING OBJECTIVES
To introduce students to the field of human-computer interaction (HCI) and the design, development and evaluation of user interfaces.

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

- Analyze user interfaces and perform Heuristic Evaluation using heuristics proposed by J. Nielsen and other researchers and practitioners.
- Recognize the basic characteristics of human perception and memory, and how these impact interaction with computers, using the Gestalt design principles, and human modeling and prediction methods such as GOMS and KLM.
- Define user “personas” and describe the user’s flow of tasks in use case scenarios.
- Elicit and analyze user requirements and define the respective functional specifications of an interactive system.
- Create sitemaps, low fidelity & high fidelity wireframes and storyboards for web-based user interfaces.
- Recognize the basic design elements for mobile user interfaces and the principles of responsive design.
- Develop complete web applications using HTML, Javascript, PHP or other frameworks.
- Define the basic information visualization steps and design interactive visualizations.

TEACHING AND LEARNING METHODS - ASSESSMENT									
TEACHING METHOD	In Class (Face to Face)								
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	Learning process supported through the use of the e-class platform (Teaching material; Announcements; Discussions on projects and laboratory assignments; Task assignments; Student groups; External links and related resources) Email communication Live transmission of lectures Ability to view recorded lectures Programming support via laboratory seminars								
TEACHING ORGANIZATION <i>Describe in detail the way and methods of teaching:</i> Enhanced Lectures, Online Lectures, Seminars, Tutorial, Laboratory, Laboratory Exercise, Study & analysis of literature, Practice (Positioning), Interactive teaching, Developing a project, Individual / group work Telework (reference to tools) etc. <i>Details of the student's study hours for each learning activity and hours of non-guided study are shown to ensure that the total workload at the semester corresponds to the ECTS</i>	The theoretical part of the syllabus is carried out through lectures in class, using multiple media. Several practical hands-on activities in the form of seminars complement the lectures and provide support for the mandatory project. The course includes a semester-long team project, in groups of 2-3, which consists of three parts: 1. The Heuristic Evaluation of an existing website using Nielsen’s usability heuristics, 2. Redesign of the evaluated web interface by a) user scenarios with personas, b) Hierarchical Task Analysis, User Needs Analysis and Functional Specifications, c) Low fidelity wireframes, prototypes, and storyboards, and 3. Web interface development. The project teams are supported through seminars and e-class discussions. <table border="1"> <thead> <tr> <th>Activity</th><th>Student Workload (hours)</th></tr> </thead> <tbody> <tr> <td>Lectures (physical presence)</td><td>39</td></tr> <tr> <td>Seminars (physical presence)</td><td>13</td></tr> <tr> <td>Group project #1 (team of 2-3)</td><td>12</td></tr> </tbody> </table>	Activity	Student Workload (hours)	Lectures (physical presence)	39	Seminars (physical presence)	13	Group project #1 (team of 2-3)	12
Activity	Student Workload (hours)								
Lectures (physical presence)	39								
Seminars (physical presence)	13								
Group project #1 (team of 2-3)	12								

	Group project #2 (team of 2-3)	28
	Group project #3 (team of 2-3)	38
	Independent Study	20
	Total Course (25 hours of workload per unit of credit)	150
ASSESSMENT OF STUDENTS <i>Description of the assessment process</i> <i>Assessment Methods, Formative or Concluding, Multiple Choice Test, Quick Response Questions, Test Development Questions, Problem Solving, Written Work, Report / Report, Oral Examination, Public Presentation, Laboratory Work, Other / Other</i> <i>Fully defined evaluation criteria are mentioned and if and where they are accessible to students.</i>	Evaluation of theory by written examination and design and programming by a compulsory project consisting of 3 parts. Grade Feedback is given in the written examination at the level of questions. In the project a rubric is given and feedback is provided accordingly with explanations in case of missing grades.	
	Assessment methods	Number
	Written examination	1
	Group project #1	1
	Group project #2	1
	Group project #3	1
	Percentage	Percentage
	Written examination	50%
	Group project #1	10%
	Group project #2	16%
	Group project #3	24%

LITERATURE AND STUDY MATERIALS / READING LIST
1. Avouris, N., Katsanos, C., Tselios, N., & Moustakas, K. (2016). <i>Introduction to Human Computer Interaction</i>. Patra: University of Patras Press. In Greek. 2. Shneiderman, B., Plaisant, C., Cohen, M., & Jacobs, S. (2009). <i>Designing the User Interface: Strategies for Effective Human-Computer Interaction</i> (5 edition). Addison Wesley. Translated in Greek. Notes, presentations, tutorials on programming and tools are provided on e-class.

INSTITUTION	NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS																			
SCHOOL	SCHOOL OF SCIENCE																			
DEPARTMENT	INFORMATICS AND TELECOMMUNICATIONS																			
COURSE LEVEL	UNDERGRADUATE																			
COURSE TITLE	Information Systems																			
COURSE CODE	ΥΣ07	Semester	7	ECTS	6															
TEACHING HOURS per week	THEORY	3	SEMINAR.		LABORATORY															
COURSE TYPE	Select one of the following and delete the rest Electives (ΠΜ) <table border="1"> <tr> <td>K</td><td>E1</td><td>E2</td><td>E3</td><td>E4</td><td>E5</td><td>E6</td></tr> <tr> <td>A</td><td></td><td></td><td>B</td><td></td><td></td><td></td></tr> </table>						K	E1	E2	E3	E4	E5	E6	A			B			
K	E1	E2	E3	E4	E5	E6														
A			B																	
URL	https://eclass.uoa.gr/courses/DI441/																			
EXPECTED PRIOR KNOWLEDGE/ PREREQUISITES AND PREPARATION:	K29 Design and Applications of Database Systems																			
TEACHING AND EXAMINATIONS LANGUAGE:	GREEK																			
THE COURSE IS OFFERED TO ERASMUS STUDENTS	NO																			

COURSE CONTENT
Introduction to definitions and concepts related to Business Information Systems. Data, Information, Information Systems, Business Applications and Operations and Processes. Study the issues of Management and Strategy of Information Systems. Study the digital transformation and the Information Systems implementation. Study the design and implementation of an operational Systems Landscape. Study the business applications development. Study the categories of Business Information Systems. The course covers Business Resource Management Systems, Customer Relationship Management Systems, Business Intelligence Systems, Decision Support Systems, Knowledge Management and Corporate Memory Systems, Supply Chain Systems and eLearning Systems. The Life Cycle of Business Applications is studied. Business Applications and Data Migration are covered. Information Systems Security and Systems Performance issues are covered. Presents the interdisciplinary perspective of Information Systems and the issues of Business Systems Applications adoption by key and end users. Study the Hardware and Software Technologies. Study the IT mega trends - Big Data analytics, Cloud, Mobility. Study the relation of business intelligence with business systems applications.

STUDENT LEARNING OBJECTIVES

Teaching-Learning Goals-Expected Learning Outcomes

To introduce students to Information Systems and Business Applications

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

- Explain the ERPs, CRMs, SCM, KMS, DSS, ESS, BI Information Systems
- Describe the Transaction Processing Systems (TPS) and Management Information Systems (MIS)
- Design an Integrated Landscape of Systems and Business Systems Applications
- Design the Data and Applications Migration Plan in Operational Environments
- Design a plan of business and systems change in the context of a digital transformation
- Define the Information Systems and Business Systems applications KPIs for performance and efficiency
- Design Integrated applications processes and construct the Blueprints
- Manage a business systems application development project
- Apply best practices for designing integrated business intelligence solutions

TEACHING AND LEARNING METHODS - ASSESSMENT

TEACHING METHOD	In Class (Face to Face)																		
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	Learning process supported by the e-class platform. Specifically: Course Description, Lecture slides, Lecture Notes, Supplementary Material, Case Studies, Announcements, Calendar, Task Assignments, Discussion of Works, External Links. Email communication Ability to track recorded lectures.																		
TEACHING ORGANIZATION <i>Describe in detail the way and methods of teaching:</i> Enhanced Lectures, Online Lectures, Seminars, Tutorial, Laboratory, Laboratory Exercise, Study & analysis of literature, Practice (Positioning), Interactive teaching, Developing a project, Individual / group work Telework (reference to tools) etc. <i>Details of the student's study hours for each learning activity and hours of non-guided study are shown to ensure that the total workload at the semester corresponds to the ECTS</i>	Theory supported with slide presentations in lectures. The Final Assignment Project includes 3 distinct units and the students support their work with presentation as well. A case study presentation is provided as optional. Additional study material is given to support theory in practice. <table> <tr> <th>Activity</th><th>Student Workload (hours)</th></tr> <tr> <td>Lectures</td><td>39</td></tr> <tr> <td>Final Project</td><td>35</td></tr> <tr> <td>Study for Final Exams</td><td>20</td></tr> <tr> <td>Critical study and analysis</td><td>20</td></tr> <tr> <td>Case Studies</td><td>23</td></tr> <tr> <td>Presentations</td><td>13</td></tr> <tr> <td>Total Course (25 hours of workload per unit of credit)</td><td>150</td></tr> <tr> <td>Extra Mile Project</td><td>16</td></tr> </table>	Activity	Student Workload (hours)	Lectures	39	Final Project	35	Study for Final Exams	20	Critical study and analysis	20	Case Studies	23	Presentations	13	Total Course (25 hours of workload per unit of credit)	150	Extra Mile Project	16
Activity	Student Workload (hours)																		
Lectures	39																		
Final Project	35																		
Study for Final Exams	20																		
Critical study and analysis	20																		
Case Studies	23																		
Presentations	13																		
Total Course (25 hours of workload per unit of credit)	150																		
Extra Mile Project	16																		

ASSESSMENT OF STUDENTS

Description of the assessment process

Assessment Methods, Formative or Concluding, Multiple Choice Test, Quick Response Questions, Test Development Questions, Problem Solving, Written Work, Report / Report, Oral Examination, Public Presentation, Laboratory Work, Other / Other

Fully defined evaluation criteria are mentioned and if and where they are accessible to students.

Students are assessed by Written Exam, Final Assignment 4IS, and Extra Mile Project 4IS (optional). For the successful completion of the course, students must achieve 3.5/7 marks in the written exam and 1.5/3 points in the Final Assignment Project. In addition, students have the opportunity to develop and present a Case Study as an Extra Mile Project.

Written examination covers the theoretical part of the subject, multiple choice questions, exercises, and critical thinking questions on the matter.

The final work is assessed with a graded criteria scheme according to the Final Project Wizard which is announced to the students. Students present and document their Final Assignment Project.

Assessment methods	Number	Percentage
Written examination	1	70%
Final Assignment 4IS	1	30%
Extra Mile Project 4IS	1	10%

LITERATURE AND STUDY MATERIALS / READING LIST

Harvey Maylor, Project Management, Kleidarithmos Publishing, 3rd edition, 2005

Information Systems Management, Kleidarithmos Publications, 11th edition, Laudon and Laudon, ISBN: 978-960-461-623-7

Lecture Notes and Slides in Information Systems

Information Systems Management: Strategy and Organization, Kleidarithmos Publications, 3rd Edition, D.Boddy, A. Boonstra, G. Kennedy, ISBN: 978-960-461-364-9

Business Administration and Information Systems, 2nd edition, G. Doukidis, Sideris Publications, ISBN: 978-960-08-0305-1

Information Systems for Business Administration, 3rd edition, Economou and Georgopoulos, Benou, ISBN: 960-359-002-9

Information Systems, 2nd Edition, G. Vassilakopoulos, Issues of Tsotras, ISBN: 978-618-5309-39-8

INSTITUTION	NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS																			
SCHOOL	SCHOOL OF SCIENCE																			
DEPARTMENT	INFORMATICS AND TELECOMMUNICATIONS																			
COURSE LEVEL	UNDERGRADUATE																			
COURSE TITLE	Didactics of Informatics																			
COURSE CODE	ΥΣ10	Semester	7	ECTS	6															
TEACHING HOURS per week	THEORY	2	SEMINAR.		LABORATORY	2														
COURSE TYPE	Select one of the following and delete the rest Electives (ΠΜ) <table border="1"> <thead> <tr> <th>K</th><th>E1</th><th>E2</th><th>E3</th><th>E4</th><th>E5</th><th>E6</th></tr> </thead> <tbody> <tr> <td>A-B</td><td>E</td><td>E</td><td>E</td><td>E</td><td>E</td><td>E</td></tr> </tbody> </table> Fill the table as in the curriculum: Track (A-Computer Science, B- Computer Engineering) / Specialization Compulsory (Y) / Core Specialization (B)/ Elective Specialization (E)						K	E1	E2	E3	E4	E5	E6	A-B	E	E	E	E	E	E
K	E1	E2	E3	E4	E5	E6														
A-B	E	E	E	E	E	E														
URL	https://eclass.uoa.gr/courses/D261/																			
EXPECTED PRIOR KNOWLEDGE/ PREREQUISITES AND PREPARATION:																				
TEACHING AND EXAMINATIONS LANGUAGE:	GREEK																			
THE COURSE IS OFFERED TO ERASMUS STUDENTS	NO																			

COURSE CONTENT
Didactics of Informatics studies the educational environment which enables the knowledge construction of primary concepts of Computer Science and the development of relevant skills. In this context a number of issues are studied concerning the teaching and learning of programming, alternative didactical approaches and educational environments that support learning, text comprehension, design of suitable learning and assessment activities. In particular, the course content involves: Main concepts of Didactics, representation of knowledge and the notion of knowledge conflict, algorithmic and computational thinking, the Greek curricula of Informatics, didactics of programming, misconceptions and difficulties, didactical approaches, didactics of structured and object programming, educational programming environments for various grades, educational games, educational robotics, the concept of analogy and its role in teaching informatics concepts, concept mapping in informatics, text comprehension of informatics material, assessment forms and tools, the Greek informatics lab.

STUDENT LEARNING OBJECTIVES

Expected Learning Outcomes

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

- define main didactics concepts and explain by example the didactic transformation
- mention and explain students' misconceptions concerning programming concepts
- name specific didactical approaches that can be used in teaching programming and apply them in designing learning activities to overcome misconceptions or achieve specific learning goals
- use computer-based/web-based educational programming environments in designing learning activities taking into consideration the characteristics of the target group and the concepts to be taught
- exploit and develop educational games for specific concepts
- design text comprehension questions following known models of text comprehension
- utilize concept maps as a tool for learning and assessment
- design assessment activities using various tools

TEACHING AND LEARNING METHODS - ASSESSMENT

TEACHING METHOD

In Class (Face to Face)

USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES

Learning process supported by the e-class platform: course description, provision of material, announcements, messages, assignment/submission of activities, provision of feedback, discussions concerning the activities/assignments

Email communication

Live transmission of lectures

Ability to track recorded lectures

Utilization of Specialized Software during labs

TEACHING ORGANIZATION

Describe in detail the way and methods of teaching:

Enhanced Lectures,

Online Lectures,

Seminars,

Tutorial,

Laboratory,

Laboratory Exercise,

Study & analysis of literature,

Practice (Positioning),

Interactive teaching,

Developing a project,

Individual / group work

Telework (reference to tools) etc.

Details of the student's study hours for each learning activity and hours of non-guided study are shown to ensure that the total workload at the semester corresponds to the ECTS

The theoretical part of the course is taking place in a typical classroom using slides, videos and teaching methods that promote students active involvement and the elicitation of their prior knowledge such as brainstorming, Q & A, discussion and activities to introduce them in the subject.

The practical part is taking place in a Microsoft Windows lab where dedicated software is installed. The students are engaged in activities that give them the chance to use various computer-based/web-based educational environments, to develop educational applications like games, simulations, etc and design learning and assessment activities. The students have to submit all the lab activities plus one personal assignment (different for each student). They present and support their work in front of their colleagues. The students participate in written exams having for use the course material in order to perform adequate knowledge and skills in the course content.

	Activity	Student Workload (hours)
	Lectures	26
	Laboratory	26
	Completion of lab activities	26
	Study and presentation of relevant literature	10
	Personal assignment	35
	Presentations and commentary of assignments	15
	Preparation for the exams	12
	Total Course	150
ASSESSMENT OF STUDENTS <i>Description of the assessment process</i> <i>Assessment Methods, Formative or Concluding, Multiple Choice Test, Quick Response Questions, Test Development Questions, Problem Solving, Written Work, Report / Report, Oral Examination, Public Presentation, Laboratory Work, Other / Other</i> <i>Fully defined evaluation criteria are mentioned and if and where they are accessible to students.</i>	In the framework of the course formative and summative assessment is followed. For each lab activity, feedback is provided to each student. As feedback to the personal assignment, they receive a rubric enriched with comments. The feedback is provided through eclass.	
	Assessment methods	Number
	Written examination	1
	Activities (lab & literature)	13
	Personal assignment	1
		Percentage
		50%
		20%
		30%

LITERATURE AND STUDY MATERIALS / READING LIST
Προτεινόμενα συγγράμματα (Εύδοξος): Διδακτικές Προσεγγίσεις και Εργαλεία για τη διδασκαλία της Πληροφορικής, Συλλογικό Επικουρικό σύγγραμμα: Κόμης, Β. (2005). Εισαγωγή στη Διδακτική της Πληροφορικής. Αθήνα: Εκδόσεις Κλειδάριθμος.

INSTITUTION	NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS																			
SCHOOL	SCHOOL OF SCIENCE																			
DEPARTMENT	INFORMATICS AND TELECOMMUNICATIONS																			
COURSE LEVEL	UNDERGRADUATE																			
COURSE TITLE	Information and Communications Technology (ICT) in Learning																			
COURSE CODE	ΥΣ15	Semester	5	ECTS	6															
TEACHING HOURS per week	THEORY	2	SEMINAR.		LABORATORY	2														
COURSE TYPE	Select one of the following and delete the rest Electives (ΠΜ) <table border="1"> <thead> <tr> <th>K</th><th>E1</th><th>E2</th><th>E3</th><th>E4</th><th>E5</th><th>E6</th></tr> </thead> <tbody> <tr> <td>A-B</td><td>E</td><td>E</td><td>E</td><td>E</td><td>E</td><td>E</td></tr> </tbody> </table> <i>Fill the table as in the curriculum: Track (A-Computer Science, B- Computer Engineering) / Specialization Compulsory (Y) / Core Specialization (B)/ Elective Specialization (E)</i>						K	E1	E2	E3	E4	E5	E6	A-B	E	E	E	E	E	E
K	E1	E2	E3	E4	E5	E6														
A-B	E	E	E	E	E	E														
URL	https://eclass.uoa.gr/courses/D58/																			
EXPECTED PRIOR KNOWLEDGE/ PREREQUISITES AND PREPARATION:																				
TEACHING AND EXAMINATIONS LANGUAGE:	GREEK																			
THE COURSE IS OFFERED TO ERASMUS STUDENTS	NO																			

COURSE CONTENT
The main aim of the course is to introduce students in educational environments and learning tools, give them the opportunity to discuss and comment on their exploitation in teaching and learning practice and support them in the development of skills for learning design that support technology enhanced learning. The content involves: learning theories, teaching strategies, lesson design/planning, curriculum design, Informatics curriculum, Multidisciplinarity, the technological pedagogical content knowledge framework, educational environments and applications that address learning theories principles, learning objects, open educational resources and repositories, models on introducing ICT in education, Web 2.0 tools for education, Webquests, didactical practices for general purpose software

STUDENT LEARNING OBJECTIVES

Expected Learning Outcomes

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

- describe the main principles of dominant learning theories
- name teaching techniques and use them in the context of designing a learning scenario
- interpret the ICT curriculum of the primary and secondary education and design relevant learning activities
- search for open educational resources, appreciate their educational value and use them in learning scenarios
- list educational Web 2.0 tools and construct learning objects
- design learning activities and scenarios by choosing educational applications and teaching techniques in order to achieve specific learning outcomes
- design projects

TEACHING AND LEARNING METHODS - ASSESSMENT			
TEACHING METHOD	In Class (Face to Face)		
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	Learning process supported by the e-class platform: course description, provision of material, announcements, messages, assignment/submission of activities, provision of feedback, discussions concerning the activities/assignments Email communication Live transmission of lectures Ability to track recorded lectures Utilization of Specialized Software during labs		
TEACHING ORGANIZATION <i>Describe in detail the way and methods of teaching:</i> Enhanced Lectures, Online Lectures, Seminars, Tutorial, Laboratory, Laboratory Exercise, Study & analysis of literature, Practice (Positioning), Interactive teaching, Developing a project, Individual / group work Telework (reference to tools) etc. <i>Details of the student's study hours for each learning activity and hours of non-guided study are shown to ensure that the total workload at the semester corresponds to the ECTS</i>	The theoretical part of the course is taking place in a typical classroom using slides, videos and teaching methods that promote students active involvement and the elicitation of their prior knowledge such as brainstorming, Q & A, discussion and activities to introduce them in the subject. The practical part is taking place in a Microsoft Windows lab where dedicated software is installed. The students are engaged in activities that give them the chance to use various computer-based/web-based educational environments that address characteristics from specific learning theories, use Web 2.0 tools in order to develop learning objects e.g. comics, timelines, mind maps), design and evaluate learning activities and project designs and discuss learning design scenario issues. The students have to submit all the lab activities plus their personal assignment (different for each student). They present and support their work in front of their colleagues. The students participate in written exams having at their disposal and for use the course material in order to perform adequate knowledge and skills in the course content. <table border="1"> <thead> <tr> <th>Activity</th><th>Student Workload</th></tr> </thead> </table>	Activity	Student Workload
Activity	Student Workload		

		(hours)
	Lectures	26
	Laboratory	26
	Completion of lab activities	26
	Study and presentation of relevant literature	10
	Personal assignment	35
	Presentations and commentary of assignments	15
	Preparation for the exams	12
	Total Course	150
ASSESSMENT OF STUDENTS <i>Description of the assessment process</i> <i>Assessment Methods, Formative or Concluding, Multiple Choice Test, Quick Response Questions, Test Development Questions, Problem Solving, Written Work, Report / Report, Oral Examination, Public Presentation, Laboratory Work, Other / Other</i> <i>Fully defined evaluation criteria are mentioned and if and where they are accessible to students.</i>	In the framework of the course formative and summative assessment is followed. For each lab activity, feedback is provided to each student. As feedback to the personal assignment, they receive a rubric enriched with comments. The feedback is provided through eclass.	
	Assessment methods	Number
	Written examination	1
	Activities (lab & literature)	13
	Personal assignment	1
		Percentage
		50%
		20%
		30%

LITERATURE AND STUDY MATERIALS / READING LIST
Προτεινόμενα συγγράμματα (Εύδοξος): Προτεινόμενα συγγράμματα (Εύδοξος): - Εισαγωγή στις εκπαιδευτικές εφαρμογές των Τεχνολογιών της Πληροφορίας και των Επικοινωνιών, Βασίλης Ι. Κόμης - Μάθε Ψηφιακά... Παίζοντας Συνεργατικά, Κορδάκη Μ., Μάνεσης Ν., Νταραντούμης Θ. Επιπλέον βιβλιογραφία - Γρηγοριάδου, Μ., Γόγουλου, Α., Γουλή, Ε., Γλέζου, Κ., Μπούμπουκα, Μ., Παπανικολάου, Κ., Τσαγκάνου, Γ., Κανίδης, Ε., Βεργίνης, Η., Δουκάκης, Δ. (2009). Διδακτικές Προσεγγίσεις και Εργαλεία για τη διδασκαλία της Πληροφορικής. Αθήνα: Εκδόσεις Νέων Τεχνολογιών. - Δημητριάδης Στ. (2015). <i>Θεωρίες Μάθησης & Εκπαιδευτικό Λογισμικό</i>. Ελληνικά Ακαδημαϊκά Ηλεκτρονικά Συγγράμματα και Βοηθήματα.

INSTITUTION	NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS																						
SCHOOL	SCHOOL OF SCIENCE																						
DEPARTMENT	INFORMATICS AND TELECOMMUNICATIONS																						
COURSE LEVEL	UNDERGRADUATE																						
COURSE TITLE	e-Government																						
COURSE CODE	ΥΣ17		Semester		8		ECTS		4														
TEACHING HOURS per week	THEORY		3		SEMINAR.				LABORATORY														
COURSE TYPE	Select one of the following and delete the rest																						
	Electives (ΠΜ)																						
	<table><tr><td>K</td><td>E1</td><td>E2</td><td>E3</td><td>E4</td><td>E5</td><td>E6</td></tr><tr><td>A</td><td></td><td></td><td>E</td><td></td><td></td><td></td></tr></table>										K	E1	E2	E3	E4	E5	E6	A			E		
K	E1	E2	E3	E4	E5	E6																	
A			E																				
URL	https://eclass.uoa.gr/courses/DI465/																						
EXPECTED PRIOR KNOWLEDGE/ PREREQUISITES AND PREPARATION:	K29 Design and Applications of Database Systems																						
TEACHING AND EXAMINATIONS LANGUAGE:	GREEK																						
THE COURSE IS OFFERED TO ERASMUS STUDENTS	NO																						

COURSE CONTENT
Introduction to definitions and concepts of eGovernment and Digital Transformation of Governance. Study of the topics of Electronic Democracy, Electronic Consultation, Electronic Participation. Analysis of Digital Services in stages. Domains and steps of eGovernment Implementation. Single Digital Market. Europe 2020 critical mission Information Systems. New technologies for eGovernment development. Software and eGovernment project material. Project management principles for the implementation of eGovernment business applications. Digital Case Studies in Greece and Europe. Study of Best practices. Digital Cities. Internet development tools and techniques for providing digital services. Business Intelligence and Big Data Analytics. Digital Transformation and Reengineering techniques. Digital Entrepreneurship.

STUDENT LEARNING OBJECTIVES
Teaching-Learning Goals-Expected Learning Outcomes To introduce students to electronic government and business systems applications of digital governance Upon successful completion of the course the student will be able to:

- Mention techniques for digital service applications implementation
- Name the techniques for design and implementation of business systems applications for digital services to citizens
- Name web design and implementation techniques for digital services
- Design integrated eGovernment solutions
- Develop a plan for Data and Business Systems Application Migration for eGovernment
- Manage a Project for eGovernment implementation
- Develop a functional specifications document for digital service applications
- Apply best practices for the development of integrated and unified digital services

TEACHING AND LEARNING METHODS - ASSESSMENT													
TEACHING METHOD	In Class (Face to Face)												
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	Learning process supported by the e-class platform. Specifically: Course Description, Lecture slides, Lecture Notes, Supplementary Material, Case Studies, Announcements, Calendar, Task Assignments, Discussion of Works, External Links. Email communication Ability to track recorded lectures.												
TEACHING ORGANIZATION <i>Describe in detail the way and methods of teaching:</i> Enhanced Lectures, Online Lectures, Seminars, Tutorial, Laboratory, Laboratory Exercise, Study & analysis of literature, Practice (Positioning), Interactive teaching, Developing a project, Individual / group work Telework (reference to tools) etc.	Theory supported with slide presentations in lectures. The Final Assignment Project includes distinct units and the students support their work with presentation as well. Additional study material is given to support theory in practice. <table border="1"> <thead> <tr> <th>Activity</th><th>Student Workload (hours)</th></tr> </thead> <tbody> <tr> <td>Lectures</td><td>39</td></tr> <tr> <td>Final Project</td><td>30</td></tr> <tr> <td>Study for Final Exams</td><td>20</td></tr> <tr> <td>Presentations</td><td>11</td></tr> <tr> <td>Total Course (25 hours of workload per unit of credit)</td><td>100</td></tr> </tbody> </table> <i>Details of the student's study hours for each learning activity and hours of non-guided study are shown to ensure that the total workload at the semester corresponds to the ECTS</i>	Activity	Student Workload (hours)	Lectures	39	Final Project	30	Study for Final Exams	20	Presentations	11	Total Course (25 hours of workload per unit of credit)	100
Activity	Student Workload (hours)												
Lectures	39												
Final Project	30												
Study for Final Exams	20												
Presentations	11												
Total Course (25 hours of workload per unit of credit)	100												

ASSESSMENT OF STUDENTS

Description of the assessment process

Assessment Methods, Formative or Concluding, Multiple Choice Test, Quick Response Questions, Test Development Questions, Problem Solving, Written Work, Report / Report, Oral Examination, Public Presentation, Laboratory Work, Other / Other

Fully defined evaluation criteria are mentioned and if and where they are accessible to students.

Students are assessed by written exam and final project. For the successful completion of the course, students must achieve 3/6 points in the written exam and 2/4 points in the final project.

Written examination covers the theoretical part of the subject, involves multiple choice questions, exercises, and critical placement questions on the matter.

The final project is evaluated with classified criteria and with a distinct weight ratio for the written report and the oral presentation - according to the Final Project Wizard which is announced to the students. The students present as well the final project.

Assessment methods	Number	Percentage
Written examination	1	60%
Final Assignment 4IS	1	40%

LITERATURE AND STUDY MATERIALS / READING LIST

Lecture Notes and Slides in eGovernment

Electronic Governance and Electronic Services to Citizens and Businesses, ISBN: 978-960-9264-54-9, Lazakidou, ISBN: 978-960-9264-54-9

Digital Businesses and E-Commerce: Strategy, Implementation and Implementation, 6th Edition, D. Chaffey, Publisher Klidarithmos, ISBN: 978-960-461-671-8

Project Management: The Management Process, 7th Edition, Larson, Gray, Klidarithmos, ISBN: 978-960-461-892-7

Innovation, Strategic Development and Information Systems, G. Doukidis, Sideris editions, ISBN: 978-960-08-0528-4

INSTITUTION	NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS																			
SCHOOL	SCHOOL OF SCIENCE																			
DEPARTMENT	INFORMATICS AND TELECOMMUNICATIONS																			
COURSE LEVEL	UNDERGRADUATE																			
COURSE TITLE	Real-Time Digital Signal Processing Systems																			
COURSE CODE	ΕΠ11	Semester	7	ECTS	6															
TEACHING HOURS per week	THEORY	2	SEMINAR.	0	LABORATORY	2														
COURSE TYPE	Select one of the following and delete the rest Electives (ΠΜ) <table border="1"> <thead> <tr> <th>K</th><th>E1</th><th>E2</th><th>E3</th><th>E4</th><th>E5</th><th>E6</th></tr> </thead> <tbody> <tr> <td>B</td><td></td><td></td><td></td><td>B</td><td></td><td></td></tr> </tbody> </table> <i>Fill the table as in the curriculum: Track (A-Computer Science, B- Computer Engineering) / Specialization Compulsory (Y) / Core Specialization (B)/ Elective Specialization (E)</i>						K	E1	E2	E3	E4	E5	E6	B				B		
K	E1	E2	E3	E4	E5	E6														
B				B																
URL	https://eclass.uoa.gr/courses/D70/																			
EXPECTED PRIOR KNOWLEDGE/ PREREQUISITES AND PREPARATION:	Course K11																			
TEACHING AND EXAMINATIONS LANGUAGE:	GREEK																			
THE COURSE IS OFFERED TO ERASMUS STUDENTS	NO																			

COURSE CONTENT
Real-time Digital Signal Processing theory and systems architecture. Computer and analog world interconnection. Signal preprocessing. Sensors and transducers (input and output). Digital to analog conversion. Analog to digital conversion. Data acquisition and control systems. Virtual instruments for measurements, filters, window functions, data conditioning. Programming and software development techniques in G language (LabVIEW environment) for a) process control, b) test and measurement applications, c) scientific calculations, d) digital signal processing, and e) measurements and control virtual instruments creation.

STUDENT LEARNING OBJECTIVES

Teaching-Learning Goals

Goals include students' familiarization with handling natural signals through rapid prototyping of special software applications using the LabVIEW (Laboratory Virtual Instrument Engineering Workbench) platform, which is an application development environment based on programming language G. Using LabVIEW students learn to solve problems, develop, debug, and test virtual instruments, use modular programming practices, select, create, and leverage common data structures, use data acquisition and instrument control in LabVIEW applications, and effectively use a state-machine architecture.

Expected Learning Outcomes

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

- Recognize the main components of the LabVIEW environment and create a new project and VI.
- Use Express VIs to produce a project and simple VI that acquires and analyzes data and then displays the results.
- Fix a broken VI, debug incorrect results and behavior of a running VI, and display errors generated by functions while a VI is running.
- Recognize the different components of a LabVIEW loop structure and apply a For Loop or a While Loop appropriately.
- Create, manipulate and use arrays, clusters, and type definition controls for data access and analysis.
- Learn to create different decision-making structures and be able to identify applications where using these structures can be beneficial.
- Recognize the benefits of reusing code and create a subVI with a properly configured connector pane, meaningful icon, documentation, and error handling.
- Explain how LabVIEW connects to hardware to get real-world measurements.
- Describe the basic concept of file I/O and apply the appropriate File I/O functions to a given scenario.
- Recognize the benefits of sequential and state-based algorithms and apply techniques in LabVIEW to enforce sequential or state execution.

TEACHING AND LEARNING METHODS - ASSESSMENT	
TEACHING METHOD	In class through lectures and slides, and in the laboratory through task (exercises) completion (face to face),
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	Learning process supported by the eClass platform (basic and supplementary educational material delivery, announcements, task assignments and submissions, project assignment and submission, course information, calendar, messages). Email communication. Use of specialized data acquisition cards (PCI hardware) http://www.ni.com/pdf/manuals/370719c.pdf and educational portable data acquisition cards (USB hardware) http://www.ni.com/en-us/shop/select/mydaq-student-data-acquisition-device. Utilization of specialized software: LabVIEW (Laboratory Virtual Instrument Engineering Workbench) https://en.wikipedia.org/wiki/LabVIEW. Utilization of NI Online Training educational environment that also offers the ability to track recorded lectures http://ni.learn.com.

TEACHING ORGANIZATION Describe in detail the way and methods of teaching: Enhanced Lectures, Online Lectures, Seminars, Tutorial, Laboratory, Laboratory Exercise, Study & analysis of literature, Practice (Positioning), Interactive teaching, Developing a project, Individual / group work Telework (reference to tools) etc. Details of the student's study hours for each learning activity and hours of non-guided study are shown to ensure that the total workload at the semester corresponds to the ECTS	Theory is presented through lectures and slides. The programming environment is presented in the laboratory. Students have access to online educational material in the form of slides, manuals, laboratory exercises, videos, and to educational self-assessment activities like quizzes and multiple-choice questions. During lab training, each student works alone, and is assigned to a workstation, equipped with specialized data acquisition and measurements hardware, and with the specialized LabVIEW environment installed. Students’ attendance to laboratory exercises is obligatory and only one absence is allowed. Students can also train at home, on their personal computer, since they have access to online lectures and tutorials, free license to use LabVIEW software, and the possibility to borrow portable data acquisition cards (hardware) for their training and for assisting the completion of their final project. The final project is implemented individually, and, during its development, the whole software development life cycle is followed; it involves the submission by the students of two intermediate reports (functional and technical specifications), and one final technical report (design, implementation, testing). <table><tr><th>Activity</th><th>Student Workload (hours)</th></tr><tr><td>Lectures</td><td>26</td></tr><tr><td>Laboratory</td><td>26</td></tr><tr><td>Laboratory exercises</td><td>32</td></tr><tr><td>Project</td><td>66</td></tr><tr><td></td><td></td></tr><tr><td>Total Course (25 hours of workload per unit of credit)</td><td>150</td></tr></table>	Activity	Student Workload (hours)	Lectures	26	Laboratory	26	Laboratory exercises	32	Project	66			Total Course (25 hours of workload per unit of credit)	150
Activity	Student Workload (hours)														
Lectures	26														
Laboratory	26														
Laboratory exercises	32														
Project	66														
Total Course (25 hours of workload per unit of credit)	150														
ASSESSMENT OF STUDENTS Description of the assessment process Assessment Methods, Formative or Concluding, Multiple Choice Test, Quick Response Questions, Test Development Questions, Problem Solving, Written Work, Report / Report, Oral Examination, Public Presentation, Laboratory Work, Other / Other Fully defined evaluation criteria are mentioned and if and where they are accessible to students.	Assessment of students is based on grading 16 laboratory exercises that students submit to eClass on predefined deadlines, and the final project. The final project is graded based on the two intermediate reports, the final technical report, and the project’s source code that are submitted to eClass. Students present their projects to their examiners and their fellow students. The final project’s application (software created by the student) is only evaluated if it runs in real time, and, during its presentation, the oral examination takes place. The final project is assessed using fully defined evaluation criteria that have been announced to students. The chance to complain and ask for re-rating is given to the students. <table><tr><th>Assessment methods</th><th>Number</th><th>Percentage</th></tr><tr><td>Laboratory exercises</td><td>16</td><td>20%</td></tr><tr><td>Final project technical report – intermediate reports – source code – public presentation – oral examination</td><td>1</td><td>80%</td></tr></table>	Assessment methods	Number	Percentage	Laboratory exercises	16	20%	Final project technical report – intermediate reports – source code – public presentation – oral examination	1	80%					
Assessment methods	Number	Percentage													
Laboratory exercises	16	20%													
Final project technical report – intermediate reports – source code – public presentation – oral examination	1	80%													

LITERATURE AND STUDY MATERIALS / READING LIST

- G. Kouroupetroglou "Real-time digital signal processing lessons" (in Greek), Athens, 2004.
- S. Sumathi, P. Surekha "LabVIEW based Advanced Instrumentation Systems", Springer-Verlag Berlin Heidelberg, 2007.
- K. Kalovrektis "LabVIEW for Engineers" (in Greek) 3rd edition, A. Tziolas Publications, 2013 (in Greek)

INSTITUTION	NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS																			
SCHOOL	SCHOOL OF SCIENCE																			
DEPARTMENT	INFORMATICS AND TELECOMMUNICATIONS																			
COURSE LEVEL	UNDERGRADUATE																			
COURSE TITLE	Optical Communications and Optical Networks																			
COURSE CODE	ΕΠ16	Semester	7	ECTS	6															
TEACHING HOURS per week	THEORY	3	SEMINAR.	1	LABORATORY															
COURSE TYPE	Select one of the following and delete the rest Electives (ΠΜ) <table border="1"> <thead> <tr> <th>K</th><th>E1</th><th>E2</th><th>E3</th><th>E4</th><th>E5</th><th>E6</th></tr> </thead> <tbody> <tr> <td>B</td><td></td><td></td><td></td><td>B</td><td>B</td><td></td></tr> </tbody> </table> Fill the table as in the curriculum: Track (A-Computer Science, B- Computer Engineering) / Specialization Compulsory (Y) / Core Specialization (B)/ Elective Specialization (E)						K	E1	E2	E3	E4	E5	E6	B				B	B	
K	E1	E2	E3	E4	E5	E6														
B				B	B															
URL	https://eclass.uoa.gr/courses/D68/																			
EXPECTED PRIOR KNOWLEDGE/ PREREQUISITES AND PREPARATION:	K12																			
TEACHING AND EXAMINATIONS LANGUAGE:	GREEK																			
THE COURSE IS OFFERED TO ERASMUS STUDENTS	NO																			

COURSE CONTENT
Basic structural and functional characteristics of the optical communications systems and networks. Transmission properties of the optical fiber, optical transmitters, amplifiers, filters and receivers. Optical communications system architectures , modulation / demodulation schemes. High bit rate linear and nonlinear systems. Optical time and wavelength division multiplexing. Basic architectiutre of core, metro and access networks

STUDENT LEARNING OBJECTIVES
Teaching-Learning Goals-Expected Learning Outcomes

To introduce the students in the major topics of the Optical communications and Optical Networks, covering the related areas at both the theoretical and applied level.

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

- Explain the transmission properties of signal in optical fibers
- Describe the different realization approaches of the optical fibers and their corresponding properties when considered as telecommunication channels
- Explain the principle of operation of semiconductor lasers and their use as optical transmitters
- Classify the different types of semiconductor laser when used as optical transmitters
- Explain the operation of optical amplifiers
- Explain the operation of optical receivers
- Design complex optical communications systems and calculate their performance parameters based on their structural and functional properties
- Describe the topology of different optical core metro and access network architectures

TEACHING AND LEARNING METHODS - ASSESSMENT																				
TEACHING METHOD	In Class (Face to Face)																			
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	Learning process supported by the e-class platform (Discussions, Announcements, Task assignments) Email communication																			
TEACHING ORGANIZATION	<table><tr><th>Activity</th><th>Student Workload (hours)</th></tr><tr><td>Lectures</td><td>39</td></tr><tr><td>Tutorial</td><td>13</td></tr><tr><td>Laboratory</td><td></td></tr><tr><td>Teamwork in a case study</td><td></td></tr><tr><td>Small individual exercises</td><td>40</td></tr><tr><td>Independent Study</td><td>45</td></tr><tr><td>.....</td><td>...</td></tr><tr><td>Total Course (25 hours of workload per unit of credit)</td><td>140</td></tr></table>		Activity	Student Workload (hours)	Lectures	39	Tutorial	13	Laboratory		Teamwork in a case study		Small individual exercises	40	Independent Study	45		...	Total Course (25 hours of workload per unit of credit)	140
Activity	Student Workload (hours)																			
Lectures	39																			
Tutorial	13																			
Laboratory																				
Teamwork in a case study																				
Small individual exercises	40																			
Independent Study	45																			
.....	...																			
Total Course (25 hours of workload per unit of credit)	140																			

Describe in detail the way and methods of teaching:
Enhanced Lectures,
Online Lectures,
Seminars,
Tutorial,
Laboratory,
Laboratory Exercise,
Study & analysis of literature,
Practice (Positioning),
Interactive teaching,
Developing a project,
Individual / group work
Telework (reference to tools) etc.

Details of the student's study hours for each learning activity and hours of non-guided study are shown to ensure that the total workload at the semester corresponds to the ECTS

ASSESSMENT OF STUDENTS

Description of the assessment process

Assessment Methods, Formative or Concluding, Multiple Choice Test, Quick Response Questions, Test Development Questions, Problem Solving, Written Work, Report / Report, Oral Examination, Public Presentation, Laboratory Work, Other / Other

Fully defined evaluation criteria are mentioned and if and where they are accessible to students.

Describe explicitly methods, evaluation tools and provided feedback.

The table below is supplemented accordingly.

Assessment methods	Number	Percentage
Written examination	1	85%
Progress		
Exercises	10	15%
Laboratory		
Final work		

LITERATURE AND STUDY MATERIALS / READING LIST

G.P. Agrawal, "Communication Systems with Optical Fibers" 4th Edition 2012, Tziolas Publ.

INSTITUTION	NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS																			
SCHOOL	SCHOOL OF SCIENCE																			
DEPARTMENT	INFORMATICS AND TELECOMMUNICATIONS																			
COURSE LEVEL	UNDERGRADUATE																			
COURSE TITLE	Digital Communications																			
COURSE CODE	ΕΠ04	Semester	7	ECTS	6															
TEACHING HOURS per week	THEORY	3	SEMINAR.	1	LABORATORY															
COURSE TYPE	Select one of the following and delete the rest Elective <table border="1"> <thead> <tr> <th>K</th><th>E1</th><th>E2</th><th>E3</th><th>E4</th><th>E5</th><th>E6</th></tr> </thead> <tbody> <tr> <td>B</td><td></td><td></td><td></td><td>E</td><td></td><td></td></tr> </tbody> </table> Fill the table as in the curriculum: Track (A-Computer Science, B- Computer Engineering) / Specialization Compulsory (Y) / Core Specialization (B)/ Elective Specialization (E)						K	E1	E2	E3	E4	E5	E6	B				E		
K	E1	E2	E3	E4	E5	E6														
B				E																
URL	https://eclass.uoa.gr/courses/ΕΠ04																			
EXPECTED PRIOR KNOWLEDGE/ PREREQUISITES AND PREPARATION:	Communication Systems (K21)																			
TEACHING AND EXAMINATIONS LANGUAGE:	GREEK																			
THE COURSE IS OFFERED TO ERASMUS STUDENTS	NO																			

COURSE CONTENT
Digital Modulation, Digital Modulation for Signals with High Efficiency, Digital Communication over Inter-Symbol-Interference Channels, Synchronization

STUDENT LEARNING OBJECTIVES
Course objectives: - to provide a detailed analysis of the various digital modulation and demodulation techniques - to provide an overview of the digital modulation methods for high spectral efficient signals - to introduce the principles of inter-symbol-interference (ISI) channels and to evaluate the performance of digital communication systems operating over such channels - to present the basic principles of the synchronization techniques (carrier and symbol timing recovery)

After the successful completion of the course the student could:

- Describe the operation of spectrally efficient digital communication systems
- Explain the principles of ISI channels and how to design digital communication systems for such channels
- Illustrate the basic concepts of synchronization for the proper operation of digital communication systems

TEACHING AND LEARNING METHODS - ASSESSMENT														
TEACHING METHOD	In Class (Face to Face)													
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	Learning process supported by the e-class platform (Provision of educational content, Announcements, Discussions) Email communication Live transmission of lectures Ability to track recorded lectures													
TEACHING ORGANIZATION <i>Describe in detail the way and methods of teaching: Enhanced Lectures, Online Lectures, Seminars, Tutorial, Laboratory, Laboratory Exercise, Study & analysis of literature, Practice (Positioning), Interactive teaching, Developing a project, Individual / group work Telework (reference to tools) etc.</i> <i>Details of the student's study hours for each learning activity and hours of non-guided study are shown to ensure that the total workload at the semester corresponds to the ECTS</i>	The theory is presented with power-point slides that are available in the e-class. More solution of more than 50 exercises are explained during the tutorials. <table><tr><th>Activity</th><th>Student Workload (hours)</th></tr><tr><td>Lectures (attendance)</td><td>39</td></tr><tr><td>Tutorial (attendance)</td><td>13</td></tr><tr><td>Independent Study of exercises</td><td>48</td></tr><tr><td>Independent Study of theory</td><td>50</td></tr><tr><td>Total Course (25 hours of workload per unit of credit)</td><td>150</td></tr></table>		Activity	Student Workload (hours)	Lectures (attendance)	39	Tutorial (attendance)	13	Independent Study of exercises	48	Independent Study of theory	50	Total Course (25 hours of workload per unit of credit)	150
Activity	Student Workload (hours)													
Lectures (attendance)	39													
Tutorial (attendance)	13													
Independent Study of exercises	48													
Independent Study of theory	50													
Total Course (25 hours of workload per unit of credit)	150													
ASSESSMENT OF STUDENTS <i>Description of the assessment process</i> <i>Assessment Methods, Formative or Concluding, Multiple Choice Test, Quick Response Questions, Test Development Questions, Problem Solving, Written Work, Report / Report, Oral Examination, Public Presentation, Laboratory Work, Other / Other</i> <i>Fully defined evaluation criteria are mentioned and if and where they are accessible to students.</i>	The evaluation method is based on a written examination with exercises of variable difficulty. After the marks have been announced, all students can review the marking on their written examinations and ask for a re-evaluation of their exam. <table><tr><th>Assessment methods</th><th>Number</th><th>Percentage</th></tr><tr><td>Written examination</td><td>1</td><td>100%</td></tr></table>		Assessment methods	Number	Percentage	Written examination	1	100%						
Assessment methods	Number	Percentage												
Written examination	1	100%												

LITERATURE AND STUDY MATERIALS / READING LIST

- G. Karagiannidis and K. Pappi “Communicational Systems”, A. Tziolas, 4th edition 2017 (in Greek)
- B. Sklar και N. Μήτρου, Ψηφιακές Επικοινωνίες και CD, 2η Έκδοση 2011 Α. ΠΑΠΑΣΩΤΗΡΙΟΥ & ΣΙΑ Α.Ε

INSTITUTION	NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS						
SCHOOL	SCHOOL OF SCIENCE						
DEPARTMENT	INFORMATICS AND TELECOMMUNICATIONS						
COURSE LEVEL	UNDERGRADUATE						
COURSE TITLE	Wireless Links						
COURSE CODE	ΕΠ13		Semester	8	ECTS	6	
TEACHING HOURS per week	THEORY	3	SEMINAR.	0	LABORATORY	1	
COURSE TYPE	Electives (ΠΜ)						
	K	E1	E2	E3	E4	E5	E6
	B					E	
URL	https://eclass.uoa.gr/courses/D74/						
EXPECTED PRIOR KNOWLEDGE/ PREREQUISITES AND PREPARATION:	Knowledge of basic principles and technologies on wireless transmission, and electromagnetic waves. Prerequisite courses: 1) a first course on Electromagnetism, Optics, Modern Physics (K12).						
TEACHING AND EXAMINATIONS LANGUAGE:	GREEK						
THE COURSE IS OFFERED TO ERASMUS STUDENTS	NO						

COURSE CONTENT
The course presents and analyzes the behavior of electromagnetic waves in the atmosphere, space, external and internal operating environments of mobile communications, as well as popular propagation models. This course presents fundamental concepts for understanding, evaluating and predicting the effects of the spread of electromagnetic waves across the spectrum and in various scenarios.

STUDENT LEARNING OBJECTIVES
Teaching-Learning Goals-Expected Learning Outcomes The aim of the course is to provide students with a deeper understanding of the principles of propagation of electromagnetic waves in space or in the air, and to be able to use popular models for study and prediction of their propagation in different environments (with emphasis on mobile systems communications). Upon successful completion of the course the student will be able to: • Predict the effects of the propagation of electromagnetic waves in the atmosphere, space and urban environments. • Calculate link budgets and select antennas, frequencies and routes for wireless communication systems.

- Describe the statistical characteristics of multi-way signals.
- Identify factors that prevent or disturb the spread of radio waves in different scenarios.
- Design the physical layer of various types of wireless telecommunication networks.

TEACHING AND LEARNING METHODS - ASSESSMENT														
TEACHING METHOD	In Class (Face to Face)													
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	Learning process supported by the e-class platform (Announcements, Teaching Material, Exercises, Recorded Videolectures) Email communication Live streaming of lectures Ability to view recorded lectures (https://delos.uoa.gr/opendelos/search?dp=di&crs=ac29ebb6).													
TEACHING ORGANIZATION	Describe in detail the way and methods of teaching: Enhanced Lectures, Online Lectures, Seminars, Tutorial, Laboratory, Laboratory Exercise, Study & analysis of literature, Practice (Positioning), Interactive teaching, Developing a project, Individual / group work Telework (reference to tools) etc. Details of the student's study hours for each learning activity and hours of non-guided study are shown to ensure that the total workload at the semester corresponds to the ECTS <table><tr><th>Activity</th><th>Student Workload (hours)</th></tr><tr><td>Lectures</td><td>39</td></tr><tr><td>Laboratory</td><td>8</td></tr><tr><td>Preparation for the Laboratory</td><td>30</td></tr><tr><td>Independent Study</td><td>73</td></tr><tr><td>Total Course (25 hours of workload per unit of credit)</td><td>150</td></tr></table>		Activity	Student Workload (hours)	Lectures	39	Laboratory	8	Preparation for the Laboratory	30	Independent Study	73	Total Course (25 hours of workload per unit of credit)	150
Activity	Student Workload (hours)													
Lectures	39													
Laboratory	8													
Preparation for the Laboratory	30													
Independent Study	73													
Total Course (25 hours of workload per unit of credit)	150													
ASSESSMENT OF STUDENTS	Description of the assessment process Assessment Methods, Formative or Concluding, Multiple Choice Test, Quick Response Questions, Test Development Questions, Problem Solving, Written Work, Report / Report, Oral Examination, Public Presentation, Laboratory Work, Other / Other Fully defined evaluation criteria are mentioned and if and where they are accessible to students. Students are assessed by written examination and the reporting of laboratory exercises. The written examination covers the theoretical part, and counts for 75% of the final grade. In the laboratory part, 2 laboratory exercises are delivered. The grade of the laboratory exercises counts for 25% of the final grade. <table><tr><th>Assessment methods</th><th>Number</th><th>Percentage</th></tr><tr><td>Written examination</td><td>1</td><td>75%</td></tr><tr><td>Laboratory</td><td>1</td><td>25%</td></tr></table>		Assessment methods	Number	Percentage	Written examination	1	75%	Laboratory	1	25%			
Assessment methods	Number	Percentage												
Written examination	1	75%												
Laboratory	1	25%												

LITERATURE AND STUDY MATERIALS / READING LIST

- A. Kanatas, G. Pantos, "Wireless Communications", Papasotiriou Publishing, 2017.
- S. Kotsopoulos, "Principles and Modeling of Wireless Transmission", Tziolas Publishing, 2015.
- S. R. Saunders, A. Aragón - Zavala (edited by D. Vougioukas), "Antennas and Dissemination for Wireless Communications Systems", Pedio Publishing, 2017.
- Ch. Kapsalis, P. Kottis, "Antennas-Wireless Connections", Tziolas Publishing, 2013.

INSTITUTION	NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS						
SCHOOL	SCHOOL OF SCIENCE						
DEPARTMENT	INFORMATICS AND TELECOMMUNICATIONS						
COURSE LEVEL	UNDERGRADUATE						
COURSE TITLE	Mobile and Wireless Communication Systems						
COURSE CODE	ΕΠ18		Semester	7	ECTS	6	
TEACHING HOURS per week	THEORY	3	SEMINAR.	1	LABORATORY	1	
COURSE TYPE	Electives (ΠΜ)						
	K	E1	E2	E3	E4	E5	E6
	B					B	
URL	https://eclass.uoa.gr/courses/D74/						
EXPECTED PRIOR KNOWLEDGE/ PREREQUISITES AND PREPARATION:	Knowledge of basic principles and technologies of packet switched networks and the Internet at the link, network and transport layers. Prerequisite courses: 1) a first course on Communication Systems (K21).						
TEACHING AND EXAMINATIONS LANGUAGE:	GREEK						
THE COURSE IS OFFERED TO ERASMUS STUDENTS	NO						

COURSE CONTENT
The course is organized into two main modules: a) general principles of wireless and cellular systems; and b) short description of modern cellular communication systems (with emphasis on GSM, UMTS, LTE). Laboratory exercises take place in the last part of the course and include short presentations on topics related to the subjects being taught.

STUDENT LEARNING OBJECTIVES
Expected Learning Outcomes Upon successful completion of the course the student will be able to: • Describe and explain the principles governing wireless and mobile networks: Functional entities, their role, processes of communication between them and their evolution over the years. • Describe and explain why wireless communication features and user mobility make it difficult to provide quality of service to wireless users and mention the most advanced protocols of wireless local area networks (IEEE 802.11), their advantages and disadvantages, and their evolution from their original form to the present day.

- Describe and explain mobility support requirements for mobile communication networks, the procedures required to meet them, and the appropriate signaling between the functional entities of the system, with emphasis on location update and handover.
- Describe and explain the initialization of communication and call origination processes on mobile communications networks, focusing on user search and signaling between calling and called user.

TEACHING AND LEARNING METHODS - ASSESSMENT														
TEACHING METHOD	In Class (Face to Face)													
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	Learning process supported by the e-class platform (Announcements, Teaching Material, Exercises, Recorded Videolectures) Email communication Live streaming of lectures Ability to view recorded lectures (https://delos.uoa.gr/opendelos/search?dp=di&crs=816970c3).													
TEACHING ORGANIZATION	Describe in detail the way and methods of teaching: Enhanced Lectures, Online Lectures, Seminars, Tutorial, Laboratory, Laboratory Exercise, Study & analysis of literature, Practice (Positioning), Interactive teaching, Developing a project, Individual / group work Telework (reference to tools) etc. Details of the student's study hours for each learning activity and hours of non-guided study are shown to ensure that the total workload at the semester corresponds to the ECTS Theory is presented with slide projection. The lectures are broadcasted live and recorded so that students can rehearse the lectures. The laboratory is organized through exercises/presentations that the students deliver through eclass at the end of the semester. <table><tr><th>Activity</th><th>Student Workload (hours)</th></tr><tr><td>Lectures</td><td>39</td></tr><tr><td>Laboratory</td><td>13</td></tr><tr><td>Preparation for the Laboratory</td><td>25</td></tr><tr><td>Independent Study</td><td>73</td></tr><tr><td>Total Course (25 hours of workload per unit of credit)</td><td>150</td></tr></table>		Activity	Student Workload (hours)	Lectures	39	Laboratory	13	Preparation for the Laboratory	25	Independent Study	73	Total Course (25 hours of workload per unit of credit)	150
Activity	Student Workload (hours)													
Lectures	39													
Laboratory	13													
Preparation for the Laboratory	25													
Independent Study	73													
Total Course (25 hours of workload per unit of credit)	150													
ASSESSMENT OF STUDENTS	Description of the assessment process Assessment Methods, Formative or Concluding, Multiple Choice Test, Quick Response Questions, Test Development Questions, Problem Solving, Written Work, Report / Report, Oral Examination, Public Presentation, Laboratory Work, Other / Other Fully defined evaluation criteria are mentioned and if and where they are accessible to students. Students are assessed by written examination and submission of the laboratory exercise/presentation. The written examination covers the theoretical part. The written examination is 70% of the final grade. The laboratory exercise is 30% of the final grade. Complaints and retrains are allowed. <table><tr><th>Assessment methods</th><th>Number</th><th>Percentage</th></tr><tr><td>Written examination</td><td>1</td><td>70%</td></tr><tr><td>Laboratory</td><td>1</td><td>30%</td></tr></table>		Assessment methods	Number	Percentage	Written examination	1	70%	Laboratory	1	30%			
Assessment methods	Number	Percentage												
Written examination	1	70%												
Laboratory	1	30%												

LITERATURE AND STUDY MATERIALS / READING LIST

- Mobile and Personal Communication Networks, 2nd Edition, M.E. Theologou, Tziolas Publishing

Additional reading

- Wireless Communications: Principles and Practice, 2nd Edition, Theodore S. Rappaport, Prentice Hall Publishing

INSTITUTION	NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS																			
SCHOOL	SCHOOL OF SCIENCE																			
DEPARTMENT	INFORMATICS AND TELECOMMUNICATIONS																			
COURSE LEVEL	UNDERGRADUATE																			
COURSE TITLE	Computational Complexity																			
COURSE CODE	ΘΠ20		Semester	7	ECTS	6														
TEACHING HOURS per week	THEORY	3	SEMINAR	1	LABORATORY															
COURSE TYPE	Select one of the following and delete the rest Electives (ΠΜ) <table border="1"> <thead> <tr> <th>K</th><th>E1</th><th>E2</th><th>E3</th><th>E4</th><th>E5</th><th>E6</th></tr> </thead> <tbody> <tr> <td>A</td><td>B</td><td></td><td></td><td></td><td></td><td></td></tr> </tbody> </table> <i>Fill the table as in the curriculum: Track (A-Computer Science, B- Computer Engineering) / Specialization Compulsory (Y) / Core Specialization (B)/ Elective Specialization (E)</i>						K	E1	E2	E3	E4	E5	E6	A	B					
K	E1	E2	E3	E4	E5	E6														
A	B																			
URL	https://eclass.uoa.gr/courses/DI436/																			
EXPECTED PRIOR KNOWLEDGE/ PREREQUISITES AND PREPARATION:	K25 Theory of Computation																			
TEACHING AND EXAMINATIONS LANGUAGE:	GREEK																			
THE COURSE IS OFFERED TO ERASMUS STUDENTS	NO																			

COURSE CONTENT
Turing Machines(T.M.) (T.M. with multiple tapes, Non-Deterministic T.M.). Church-Turing Thesis. Difference in Complexity of T.M., T.M. with multiple tapes and Non-Deterministic T.M.. Time Complexity of Non-Deterministic T.M.. The class P. The class NP. Syntactic Definition of NP. The class CO-NP. The class EXP. Reductions and Completeness, the notion of NP-Completeness. Cook-Levin Theorem. NP-Complete Languages. Pseudo-Polynomial Algorithms and Strongly NP-Complete Languages. Savitch Theorem. The class PSPACE. PSPACE-Completeness. The classes L, NL and EXPSPACE. NL-Completeness. Space Hierarchy Theorem. Time Hierarchy Theorem.

STUDENT LEARNING OBJECTIVES

Teaching-Learning Goals-Expected Learning Outcomes

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

- Formally express Computational Problems and encode them as Languages of a certain alphabet.
- Classify languages into Time and Space Complexity classes.
- Devise and write rigorously mathematical proofs concerning the Time or Space Complexity of a Language, as well as to implement Reductions for this (such as Polynomial-time and Logarithmic-space Reductions).

TEACHING AND LEARNING METHODS - ASSESSMENT

TEACHING METHOD	In Class (Face to Face)																	
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	Learning process supported by the e-class platform (Teaching material; Announcements; Task assignments; Outside links etc) Email communication.																	
TEACHING ORGANIZATION	<table><thead><tr><th>Activity</th><th>Student Workload (hours)</th></tr></thead><tbody><tr><td>Lectures (physical presence)</td><td>39</td></tr><tr><td>Seminars (physical presence)</td><td>13</td></tr><tr><td>Independent study and analysis of literature</td><td>70</td></tr><tr><td>Seminary preparation</td><td>13</td></tr><tr><td>Homeworks</td><td>15</td></tr><tr><td></td><td></td></tr><tr><td>Total Course (25 hours of workload per unit of credit)</td><td>150</td></tr></tbody></table>		Activity	Student Workload (hours)	Lectures (physical presence)	39	Seminars (physical presence)	13	Independent study and analysis of literature	70	Seminary preparation	13	Homeworks	15			Total Course (25 hours of workload per unit of credit)	150
Activity	Student Workload (hours)																	
Lectures (physical presence)	39																	
Seminars (physical presence)	13																	
Independent study and analysis of literature	70																	
Seminary preparation	13																	
Homeworks	15																	
Total Course (25 hours of workload per unit of credit)	150																	
	Extensive use of the blackboard. Emphasis is placed on examples and problem solving. Homeworks are individual or in groups of 3.																	
ASSESSMENT OF STUDENTS	Evaluation by written examination and homework assignments. Grade Feedback is available upon request.																	

Assessment Methods, Formative or Concluding, Multiple Choice Test, Quick Response Questions, Test Development Questions, Problem Solving, Written Work, Report / Report, Oral Examination, Public Presentation, Laboratory Work, Other / Other

Fully defined evaluation criteria are mentioned and if and where they are accessible to students.

Assessment methods	Number	Percentage
Written examination	1	80%
Exercises	1-2	20%

LITERATURE AND STUDY MATERIALS / READING LIST

- Michael Sipser, Εισαγωγή στην Θεωρία Υπολογισμού, Πανεπιστημιακές Εκδόσεις Κρήτης 2007
- Harry R. Lewis, Χρήστος Παπαδημητρίου: Στοιχεία Θεωρίας Υπολογισμού, Εκδόσεις Κριτική 2005
- Christos H. Papadimitriou: Computational Complexity, Pearson publications 1993
- Michael R. Garey, David S. Johnson: Computers and Intractability: A Guide to the Theory of NP-completeness, W. H. Freeman and Company 1979
- Sanjeev Arora and Boaz Barak: Computational Complexity: A Modern Approach, Cambridge University Press 2007
- John E Hopcroft, Rajeev Motwani, Jeffrey D Ullman: Introduction to automata theory, languages, and computation, Addison-Wesley 1979

INSTITUTION	NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS																			
SCHOOL	SCHOOL OF SCIENCE																			
DEPARTMENT	INFORMATICS AND TELECOMMUNICATIONS																			
COURSE LEVEL	UNDERGRADUATE																			
COURSE TITLE	Computational Geometry																			
COURSE CODE	ΘΠ11	Semester	8	ECTS	6															
TEACHING HOURS per week	THEORY	3	SEMINAR.	1	LABORATORY															
COURSE TYPE	Select one of the following and delete the rest Electives (ΠΜ) <table border="1"> <thead> <tr> <th>K</th><th>E1</th><th>E2</th><th>E3</th><th>E4</th><th>E5</th><th>E6</th></tr> </thead> <tbody> <tr> <td></td><td>B</td><td>E</td><td></td><td></td><td></td><td></td></tr> </tbody> </table> Core Specialization (B)/ Elective Specialization (E)						K	E1	E2	E3	E4	E5	E6		B	E				
K	E1	E2	E3	E4	E5	E6														
	B	E																		
URL	https://eclass.uoa.gr/courses/D42/																			
EXPECTED PRIOR KNOWLEDGE/ PREREQUISITES AND PREPARATION:	Recommended: Algorithms and Complexity																			
TEACHING AND EXAMINATIONS LANGUAGE:	GREEK																			
THE COURSE IS OFFERED TO ERASMUS STUDENTS	NO																			

COURSE CONTENT
Introduction to Geometric Algorithms and Extensions to the Research Areas of Computational Geometry. In particular: • Convexity in two dimensions and in three dimensions, but also in a general dimension. • Volume of curved polyhedra and Minkowski Sum of Polyhedra. • Triangulation and Delaunay Triangulation / Voronoi Diagram. • Geometric Search Algorithms, Geometric Data Structures, Nearest Neighbor, clustering. Also, topics on geometric algorithms and the use of libraries (eg CGAL) for the development of geometric software in programming languages like C / C ++, and Python are presented.

STUDENT LEARNING OBJECTIVES
Teaching-Learning Goals-Expected Learning Outcomes: Introduction to Geometric Algorithms in an understandable way and using basic mathematical knowledge and data structures so that students can see modern applications and extensions to active research areas of Computational Geometry. It is based on both on theory and applications.

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

- Explain the notion of Convexity in two dimensions and in three dimensions
- Describe the basic concept of Delaunay Triangulation and Triangulation / Voronoi Diagram
- Handle Minkowski sum and Polyhedra
- Address Basic Geometric Search algorithms
- Design, develop and evaluate Python applications

TEACHING AND LEARNING METHODS - ASSESSMENT																		
TEACHING METHOD	In Class (Face to Face)																	
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	Learning process supported by the e-class platform (specifically Course Description, Class Material, Discussions, Announcements, Task assignments, Student groups, Questionnaires, External links). Email communication.																	
TEACHING ORGANIZATION	<table><thead><tr><th>Activity</th><th>Student Workload (hours)</th></tr></thead><tbody><tr><td>Lectures</td><td>39</td></tr><tr><td>Studying and Slides</td><td>30</td></tr><tr><td>Studying Python</td><td>20</td></tr><tr><td>Small individual exercises</td><td>30</td></tr><tr><td>Small group exercises</td><td>--</td></tr><tr><td>Independent Studying for final assignment</td><td>31</td></tr><tr><td>Total Course (25 hours of workload per unit of credit)</td><td>150</td></tr></tbody></table>		Activity	Student Workload (hours)	Lectures	39	Studying and Slides	30	Studying Python	20	Small individual exercises	30	Small group exercises	--	Independent Studying for final assignment	31	Total Course (25 hours of workload per unit of credit)	150
Activity	Student Workload (hours)																	
Lectures	39																	
Studying and Slides	30																	
Studying Python	20																	
Small individual exercises	30																	
Small group exercises	--																	
Independent Studying for final assignment	31																	
Total Course (25 hours of workload per unit of credit)	150																	
	Theory is presented with slide projection. The programming environments are presented in demonstration workshops in real-time parallel machines. Assignment is given in groups of 1-2 students. Support with discussions in eclass																	
ASSESSMENT OF STUDENTS	<table><thead><tr><th>Assessment methods</th><th>Number</th><th>Percentage</th></tr></thead><tbody><tr><td>assignments</td><td>5</td><td>50%</td></tr><tr><td>Final project</td><td>1</td><td>50%</td></tr></tbody></table>		Assessment methods	Number	Percentage	assignments	5	50%	Final project	1	50%							
Assessment methods	Number	Percentage																
assignments	5	50%																
Final project	1	50%																

--	--

LITERATURE AND STUDY MATERIALS / READING LIST

Ioannis Emiris. Computational geometry: a modern algorithmic approach. Kleidarithmos Publishing, 2008.
Mark Overmars et al. Computational geometry and Applications. Springer.
Notes and Slides for Python.

INSTITUTION	NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS					
SCHOOL	SCHOOL OF SCIENCE					
DEPARTMENT	INFORMATICS AND TELECOMMUNICATIONS					
COURSE LEVEL	UNDERGRADUATE					
COURSE TITLE	Parallel Algorithms					
COURSE CODE	ΘΠ19	Semester	8	ECTS	6	
TEACHING HOURS per week	THEORY	3	SEMINAR.	1	LABORATORY	
COURSE TYPE	Track Compulsory (EYM)					
	K	E1	E2	E3	E4	E5
	A	E				
URL	https://eclass.uoa.gr/courses/DI307/					
EXPECTED PRIOR KNOWLEDGE/ PREREQUISITES AND PREPARATION:	Recommended compulsory K17 Algorithms and Complexity					
TEACHING AND EXAMINATIONS LANGUAGE:	GREEK					
THE COURSE IS OFFERED TO ERASMUS STUDENTS	NO					

COURSE CONTENT
The course introduces the concept of design and analysis of parallel numerical and non numerical algorithms. In particular, covers the following subjects: Part I : Parallel Non Numerical Algorithms. Introductory concepts, Parallel Architectures, Methods of design and development of Parallel Algorithms, Efficiency of Parallel algorithms, Parallel Selection, Parallel Merge, Parallel Sorting and Searching, Parallel Graph Algorithms, Parallel Algorithms of Computational Geometry. Part II : Parallel numerical algorithms. Introductory concepts, Parallel matrix computations (parallel transpose of a matrix, parallel matrix vector multiplication, parallel matrix multiplication), Parallel direct methods for solving linear systems (parallel Gaussian Elimination, parallel Gauss-Jordan, parallel Huard, Parallel LU, parallel WZ), Parallel Iterative methods for solving linear systems with application to the solution of Partial Differential equations (Red-Black SOR, multicolor SOR, Local SOR), Parallel methods for computing the eigenpair of a matrix. Systolic algorithms.

Also, during the tutorials students are introduced to the basics of MPI for the implementation of the parallel algorithms of the course.

STUDENT LEARNING OBJECTIVES

Teaching-Learning Goals-Expected Learning Outcomes

To introduce students to the basic techniques of design and development parallel algorithms for the different parallel architectures.

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

- Describe the basic techniques for the development of parallel algorithms.
- Compare the efficiency of two parallel algorithms.
- Design and develop efficient parallel algorithms for various parallel architectures.
- Evaluate the suitability of a parallel algorithm for a given problem.
- Implement parallel algorithms using MPI.

TEACHING AND LEARNING METHODS – ASSESSMENT

TEACHING METHOD	In Class (Face to Face)				
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	Learning process supported by the e-class platform. In particular, slide presentation of course and laboratory lectures, Discussions, Announcements, Task assignments and submissions, Student groups, Laboratory assignments, External Links of electronic books, notes, chapters, lectures, international Laboratories and Job announcements. Email communication Live transmission of lectures Ability to track recorded lectures Utilization of MPI				
TEACHING ORGANIZATION <i>Describe in detail the way and methods of teaching:</i> Enhanced Lectures, Online Lectures, Seminars, Tutorial, Laboratory, Laboratory Exercise, Study & analysis of literature, Practice (Positioning), Interactive teaching, Developing a project, Individual / group work	The theory and the tutorials are presented by slides. Students are required to submit 2 individual assignments which require the design, development and evaluation of algorithms implemented in MPI. The students have the possibility of taking advice through discussions in eclass or during office hours. <table border="1"> <thead> <tr> <th>Activity</th><th>Student Workload (hours)</th></tr> </thead> <tbody> <tr> <td> </td><td> </td></tr> </tbody> </table>	Activity	Student Workload (hours)		
Activity	Student Workload (hours)				

<i>Telework (reference to tools)etc.</i> <i>Details of the student's study hours for each learning activity and hours of non-guided study are shown to ensure that the total workload at the semester corresponds to the ECTS</i>	Lectures	39
	Tutorial	13
	Study MPI Laboratory	13
	Individual Assignments	40
	Independent Study	45
	Total Course	150
ASSESSMENT OF STUDENTS <i>Description of the assessment process</i> <i>Assessment Methods, Formative or Concluding, Multiple Choice Test, Quick Response Questions, Test Development Questions, Problem Solving, Written Work, Report / Report, Oral Examination, Public Presentation, Laboratory Work, Other / Other</i> <i>Fully defined evaluation criteria are mentioned and if and where they are accessible to students.</i>	The students are required to submit 2 individual assignments and take the final exam. The final exam is a problem solving type and covers the theoretical part of the course while the individual assignments require implementation of algorithms and cover the programming part. Students are eligible to access their written exam paper as well as their assignments and make comments on the evaluation.	
	Assessment methods	Number
	Written examination	1
	Assignments	2
		Percentage
		70%
		30%

LITERATURE AND STUDY MATERIALS / READING LIST
1. Pantziou G, Mamalis B and Tomaras A., Introduction to Parallel Computing, New Technologies Publ., 2013. 2. Gene H. Golub, Charles F. Van Loan, Theory and Matrix Computations, John Hopkins University Press, 2015 (translated in greek, Pedio Publ.).

INSTITUTION	NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS																			
SCHOOL	SCHOOL OF SCIENCE																			
DEPARTMENT	INFORMATICS AND TELECOMMUNICATIONS																			
COURSE LEVEL	UNDERGRADUATE																			
COURSE TITLE	Speech and Natural Language Processing																			
COURSE CODE	ΕΠ19	Semester	8	ECTS	6															
TEACHING HOURS per week	THEORY	3	SEMINAR.		LABORATORY	1														
COURSE TYPE	Select one of the following and delete the rest Electives (ΠΜ) <table border="1"> <thead> <tr> <th>K</th><th>E1</th><th>E2</th><th>E3</th><th>E4</th><th>E5</th><th>E6</th></tr> </thead> <tbody> <tr> <td>A-B</td><td></td><td>E</td><td></td><td></td><td></td><td>B</td></tr> </tbody> </table> <i>Fill the table as in the curriculum: Track (A-Computer Science, B- Computer Engineering) / Specialization Compulsory (Y) / Core Specialization (B)/ Elective Specialization (E)</i>						K	E1	E2	E3	E4	E5	E6	A-B		E				B
K	E1	E2	E3	E4	E5	E6														
A-B		E				B														
URL	https://eclass.uoa.gr/courses/D75/																			
EXPECTED PRIOR KNOWLEDGE/ PREREQUISITES AND PREPARATION:	K11																			
TEACHING AND EXAMINATIONS LANGUAGE:	GREEK																			
THE COURSE IS OFFERED TO ERASMUS STUDENTS	NO																			

COURSE CONTENT
Basic characteristics of speech signals. Mechanisms and models of speech production. Hearing and perception of speech. Methodologies for Digital analysis of speech signals. The Linear Prediction Coding method. Digital coding of speech. Text to speech conversion. Speech recognition methods. Natural language processing in text-to-speech and in speech recognition. Speech in human-computer interaction. Applications of speech processing in information and telecommunication systems.

STUDENT LEARNING OBJECTIVES
The course objectives include: the familiarisation of the students with the main methodologies for the analysis of the speech signal, text-to-speech conversion, and automatic speech recognition aiming to apply them in practice in speech-based Human-Computer Interaction, Spoken Dialogue Interactive Systems, Voice browsers, voice portals, emended systems with speech and Assistive Technologies for the disabled. After the successful competition of the course the student will be able to:

- Explain and describe the main mechanisms and models of speech production and speech perception as well as the basic characteristics of the speech signals
- Recognize and describe the main methodologies and architectures for speech recognition and the related natural language processing methods
- Recognize and describe the basic methods for speech synthesis and text-to-speech conversion along with the related natural language processing methods as well as their evolution
- Design, develop and evaluate speech synthesis, text-to-speech and recognition applications
- Use speech signals' analysis and processing applications

TEACHING AND LEARNING METHODS - ASSESSMENT

TEACHING METHOD	In Class and in the Laboratory (Face to Face)												
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	Learning process supported by the e-class platform (provision of basic and supplementary educational content, Announcements, assignment and delivery of exercises). Email communication. Utilization of Specialized Software in the Lab.: • PRAAT: doing phonetics by computer http://www.fon.hum.uva.nl/praat/ • SFS: Speech File System https://www.phon.ucl.ac.uk/resource/sfs/												
TEACHING ORGANIZATION <i>Describe in detail the way and methods of teaching:</i> Enhanced Lectures, Online Lectures, Seminars, Tutorial, Laboratory, Laboratory Exercise, Study & analysis of literature, Practice (Positioning), Interactive teaching, Developing a project, Individual / group work Telework (reference to tools) etc.	The theory is presented with power-point slides that are available in the e-class. The programming environments are presented in the laboratory. In the Lab each student is working in an individual workstation and independently from the other students. The attendance of the students in the laboratory exercises is mandatory and only one absence is permitted. <table border="1"> <thead> <tr> <th>Activity</th><th>Student Workload (hours)</th></tr> </thead> <tbody> <tr> <td>Lectures (attendance)</td><td>39</td></tr> <tr> <td>Laboratory (attendance)</td><td>13</td></tr> <tr> <td>Independent study and formulation of answers' report for the exercises</td><td>45</td></tr> <tr> <td>Independent Study of the theory</td><td>53</td></tr> <tr> <td>Total Course (25 hours of workload per unit of credit)</td><td>150</td></tr> </tbody> </table>	Activity	Student Workload (hours)	Lectures (attendance)	39	Laboratory (attendance)	13	Independent study and formulation of answers' report for the exercises	45	Independent Study of the theory	53	Total Course (25 hours of workload per unit of credit)	150
Activity	Student Workload (hours)												
Lectures (attendance)	39												
Laboratory (attendance)	13												
Independent study and formulation of answers' report for the exercises	45												
Independent Study of the theory	53												
Total Course (25 hours of workload per unit of credit)	150												

ASSESSMENT OF STUDENTS

Description of the assessment process

Assessment Methods, Formative or Concluding, Multiple Choice Test, Quick Response Questions, Test Development Questions, Problem Solving, Written Work, Report / Report, Oral Examination, Public Presentation, Laboratory Work, Other / Other

Fully defined evaluation criteria are mentioned and if and where they are accessible to students.

Evaluation method is based: a) on the 15 laboratory reports the students have uploaded to the e-class in predefined deadlines and b) on a written examination based on questions with variable difficulty. Students can access the errors on their written examinations and ask for a regrading. The grade of the exercises is taken into account in the final evaluation in the case the student achieves a grade of 5 (in the scale of 10).

Assessment methods	Number	Percentage
Written examination	1	70%
Laboratory Exercises	15	30%

LITERATURE AND STUDY MATERIALS / READING LIST

G. Kouroupetroglou «Lessons of Speech Processing», Athens 2005, Lecture Notes in Greek (available through the e-class)

L. Rabiner “Digital Speech Processing: Theory and Applications”, Paschalidis Editions, Greek translation, 2011

INSTITUTION	NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS																			
SCHOOL	SCHOOL OF SCIENCE																			
DEPARTMENT	INFORMATICS AND TELECOMMUNICATIONS																			
COURSE LEVEL	UNDERGRADUATE																			
COURSE TITLE	Software Engineering																			
COURSE CODE	ΥΣ09	Semester	8	ECTS	6															
TEACHING HOURS per week	THEORY	3	SEMINAR.	1	LABORATORY															
COURSE TYPE	Select one of the following and delete the rest Electives (ΠΜ) <table border="1"> <thead> <tr> <th>K</th><th>E1</th><th>E2</th><th>E3</th><th>E4</th><th>E5</th><th>E6</th></tr> </thead> <tbody> <tr> <td>A</td><td></td><td></td><td>B</td><td></td><td></td><td></td></tr> </tbody> </table> <i>Fill the table as in the curriculum: Track (A-Computer Science, B- Computer Engineering) / Specialization Compulsory (Y) / Core Specialization (B)/ Elective Specialization (E)</i>						K	E1	E2	E3	E4	E5	E6	A			B			
K	E1	E2	E3	E4	E5	E6														
A			B																	
URL	https://eclass.uoa.gr/courses/DI423/																			
EXPECTED PRIOR KNOWLEDGE/ PREREQUISITES AND PREPARATION:	K10 – Object Oriented Programming																			
TEACHING AND EXAMINATIONS LANGUAGE:	GREEK																			
THE COURSE IS OFFERED TO ERASMUS STUDENTS	NO																			

COURSE CONTENT
The course offers an introduction to the field of Software Engineering, highlighting the various software design, quality and management issues that occur during the development of large software projects, while presenting the current state of the art in addressing these issues. Specifically, the course covers software life-cycle phases and their management methodologies, focusing on (a) the agile methodology in general and Scrum in particular, (b) the DevOps methodology and specifically the issues underlying version control, build automation and test automation. The course also deals with software design and architecture, discussing analysis and modeling of requirements, object-oriented design and architectural patterns, emphasizing the architectural choices that arise from the CAP theorem. Finally, the course also presents the latest techniques used in the development of Web-based user interfaces.

STUDENT LEARNING OBJECTIVES

Teaching-Learning Goals-Expected Learning Outcomes

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

- Explain the software life-cycle, its phases and the methodologies used to manage them.
- Describe, classify, model and analyze software requirements.
- Classify, compare and/or select the basic design and architectural patterns that build a complex software application.
- Design, specify and develop large software using best practices.
- Organize, manage and evaluate the tasks required to build a large software application.

TEACHING AND LEARNING METHODS - ASSESSMENT													
TEACHING METHOD	In Class (Face to Face)												
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	Learning process supported by the e-class platform (Units, Announcements, Documents, Texts, Student teams, Discussions). Email communication. Live transmission of lectures. Ability to track recorded lectures. Utilization of software code repositories in the course's laboratory and team projects.												
TEACHING ORGANIZATION <i>Describe in detail the way and methods of teaching:</i> Enhanced Lectures, Online Lectures, Seminars, Tutorial, Laboratory, Laboratory Exercise, Study & analysis of literature, Practice (Positioning), Interactive teaching, Developing a project, Individual / group work Telework (reference to tools) etc.	<table> <tr> <th>Activity</th><th>Student Workload (hours)</th></tr> <tr> <td>Lectures</td><td>52</td></tr> <tr> <td>Laboratory</td><td>13</td></tr> <tr> <td>Team project (5-7 students)</td><td>60</td></tr> <tr> <td>Individual study</td><td>25</td></tr> <tr> <td>Total</td><td>150</td></tr> </table> <i>Details of the student's study hours for each learning activity and hours of non-guided study are shown to ensure that the total workload at the semester corresponds to the ECTS</i>	Activity	Student Workload (hours)	Lectures	52	Laboratory	13	Team project (5-7 students)	60	Individual study	25	Total	150
Activity	Student Workload (hours)												
Lectures	52												
Laboratory	13												
Team project (5-7 students)	60												
Individual study	25												
Total	150												

ASSESSMENT OF STUDENTS

Description of the assessment process

Assessment Methods, Formative or Concluding, Multiple Choice Test, Quick Response Questions, Test Development Questions, Problem Solving, Written Work, Report / Report, Oral Examination, Public Presentation, Laboratory Work, Other / Other

Fully defined evaluation criteria are mentioned and if and where they are accessible to students.

The written examination contains multiple choice tests, quick response questions and a test development – problem solving question. The team project involves group work with intermediary milestones that receive direct feedback from the instructor as well as a public presentation at its completion.

Assessment methods	Number	Percentage
Written examination	1	50%
Team project	2	50%

LITERATURE AND STUDY MATERIALS / READING LIST

- Software Engineering: Theory and Practice, 2nd Edition, PFLEEGER, Kleidarithmos publishing (in Greek)
- Software Engineering, 8th Edition, SOMMERVILLE, Kleidarithmos publishing (in Greek)
- Software Engineering, 8th Edition, PRESSMAN, Tziola publishing (in Greek)

The course also offers an extended reading list available at its website.

INSTITUTION	NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS					
SCHOOL	SCHOOL OF SCIENCE					
DEPARTMENT	INFORMATICS AND TELECOMMUNICATIONS					
COURSE LEVEL	UNDERGRADUATE					
COURSE TITLE	Innovation and Entrepreneurship					
COURSE CODE	ΥΣ12		Semester	8	ECTS	4
TEACHING HOURS per week	THEORY	2	SEMINAR.	1	LABORATORY	
COURSE TYPE	Electives(ΠΜ)					
URL	https://eclass.uoa.gr/courses/DI368/					
EXPECTED PRIOR KNOWLEDGE/ PREREQUISITES AND PREPARATION:						
TEACHING AND EXAMINATIONS LANGUAGE:	GREEK					
THE COURSE IS OFFERED TO ERASMUS STUDENTS	NO					

COURSE CONTENT
The course includes the main body of knowledge and skills in the fields of entrepreneurship and innovation and covers the following topics: Concept and Importance of Entrepreneurship and Innovation. Business and economic environment. Business opportunity, uncertainty, business risk and decision-making. Business skills, entrepreneur profile. The business process cycle (business concept, business opportunity assessment, business model development, business plan creation, funding sources). Establishment of a business. International entrepreneurship. Social entrepreneurship. Corporate Social Responsibility and Business Ethics. National policies on entrepreneurship and community actions.

STUDENT LEARNING OBJECTIVES
Teaching-Learning Goals-Expected Learning Outcomes Upon successful completion of the course the student will be able to: • Define the concept of entrepreneurship and innovation. • Identify types of innovation. • Evaluate the importance of innovation at company level and its importance in economic growth. • Describe the profile and skills of the entrepreneur.

- Develop the ability to identify and exploit the right opportunities for doing business.
- Identify the components of a business plan.
- Develop a business plan.
- Identify the different legal forms of business.
- Identify and distinguish social entrepreneurship from other forms of entrepreneurship.

TEACHING AND LEARNING METHODS - ASSESSMENT																
TEACHING METHOD	In Class (Face to Face)															
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	• Use ICT in Teaching. • Support the learning process through the course's website. Notes and educational material, etc. • Useful links from Greek and European websites related to European Union policies, financial tools and programs.															
TEACHING ORGANIZATION <i>Describe in detail the way and methods of teaching:</i> <i>Enhanced Lectures,</i> <i>Online Lectures,</i> <i>Seminars,</i> <i>Tutorial,</i> <i>Laboratory,</i> <i>Laboratory Exercise,</i> <i>Study & analysis of literature,</i> <i>Practice (Positioning),</i> <i>Interactive teaching,</i> <i>Developing a project,</i> <i>Individual / group work</i> <i>Telework (reference to tools)etc.</i> <i>Details of the student's study hours for each learning activity and hours of non-guided study are shown to ensure that the total workload at the semester corresponds to the ECTS</i>	Lectures are supported by slide show. The teaching techniques which are followed are: questions and answers, discussion, brainstorming are followed. Also, whenever is possible, entrepreneurs are invited and present their activity, as well as young people who have already established a new business. In the tutorial students made case studies, as well as the steps of developing a business plan. <table><tr><th>Activity</th><th>Student Workload (hours)</th></tr><tr><td>Lectures</td><td>26</td></tr><tr><td>Tutorial</td><td>13</td></tr><tr><td>Case Study</td><td>6</td></tr><tr><td>Final Work-Business Plan</td><td>40</td></tr><tr><td>Independent Study</td><td>15</td></tr><tr><td>Total Course</td><td>100</td></tr></table>		Activity	Student Workload (hours)	Lectures	26	Tutorial	13	Case Study	6	Final Work-Business Plan	40	Independent Study	15	Total Course	100
Activity	Student Workload (hours)															
Lectures	26															
Tutorial	13															
Case Study	6															
Final Work-Business Plan	40															
Independent Study	15															
Total Course	100															
ASSESSMENT OF STUDENTS <i>Description of the assessment process</i> <i>Assessment Methods, Formative or Concluding, Multiple Choice Test, Quick Response Questions, Test Development Questions, Problem Solving, Written Work, Report / Report, Oral Examination, Public Presentation, Laboratory Work, Other / Other Fully defined evaluation criteria are mentioned and if and where they are accessible to students.</i>	Students are assessed through a written examination that includes multiple choice questions and evaluation of theory data as well as a final work. <table><tr><th>Assessment methods</th><th>Number</th><th>Percentage</th></tr><tr><td>Written examination</td><td>1</td><td>30%</td></tr><tr><td>Final Work-Business Plan</td><td>1</td><td>70%</td></tr></table>		Assessment methods	Number	Percentage	Written examination	1	30%	Final Work-Business Plan	1	70%					
Assessment methods	Number	Percentage														
Written examination	1	30%														
Final Work-Business Plan	1	70%														

LITERATURE AND STUDY MATERIALS / READING LIST

- Karagiannis, H. & Bakouros, I. Innovation and Entrepreneurship. Theory - act. Sofia Publications, 2010.
- Chatzikonstantinou, G. & Goniadis, H. Entrepreneurship and Innovation. Gutenberg Publications, 2009.
- Kefis, V. & Papazachariou, P. The Business Vision in a Business Plan. Kritiki Publications, 2009.
- Deakins, D. & Freel, M. Entrepreneurship & Small Business. Newborn businesses. Rosili Publications, 2012.
- Course notes.

INSTITUTION	NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS																			
SCHOOL	SCHOOL OF SCIENCE																			
DEPARTMENT	INFORMATICS AND TELECOMMUNICATIONS																			
COURSE LEVEL	UNDERGRADUATE																			
COURSE TITLE	School Classroom and Microteaching																			
COURSE CODE	ΥΣ21	Semester	8	ECTS	6															
TEACHING HOURS per week	THEORY	2	SEMINAR.		LABORATORY	2														
COURSE TYPE	Select one of the following and delete the rest Electives (ΠΜ) <table border="1"> <thead> <tr> <th>K</th><th>E1</th><th>E2</th><th>E3</th><th>E4</th><th>E5</th><th>E6</th></tr> </thead> <tbody> <tr> <td>A-B</td><td>E</td><td>E</td><td>E</td><td>E</td><td>E</td><td>E</td></tr> </tbody> </table> <i>Fill the table as in the curriculum: Track (A-Computer Science, B- Computer Engineering) / Specialization Compulsory (Y) / Core Specialization (B)/ Elective Specialization (E)</i>						K	E1	E2	E3	E4	E5	E6	A-B	E	E	E	E	E	E
K	E1	E2	E3	E4	E5	E6														
A-B	E	E	E	E	E	E														
URL	https://eclass.uoa.gr/courses/DI458/																			
EXPECTED PRIOR KNOWLEDGE/ PREREQUISITES AND PREPARATION:	ΥΣ15 ICT in Learning ΥΣ10 Didactics of Informatics																			
TEACHING AND EXAMINATIONS LANGUAGE:	GREEK																			
THE COURSE IS OFFERED TO ERASMUS STUDENTS	NO																			

COURSE CONTENT
The prospective teacher, besides skills in learning design, it is important to know the features and the main components of the classroom and school community and to develop skills in teaching. In the framework of the course related issues are studied such as: Teachers and their role, organization and management of the classroom, the classroom as a community of interest, organization and operation of school, design of teaching, interpersonal relationships in the classroom, evaluation in education, the cultivation of critical thinking and creative thinking, design of microteaching, application of microteaching, observation, analysis and evaluation of microteaching

STUDENT LEARNING OBJECTIVES

Expected Learning Outcomes

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

- describe issues related to school operation and management
- explain and appreciate the factors that contribute to the development of a positive climate in the classroom
- name and apply techniques to develop creativity in school
- describe models and forms of evaluation in education
- define and explain the principles of microteaching
- structure, design and perform a microteaching
- apply teaching skills
- self-assess her/his microteaching
- adopt or ignore feedback comments concerning her/his microteaching and justify the proposed changes
- evaluate and comment on specific parts of a teaching

TEACHING AND LEARNING METHODS - ASSESSMENT		
TEACHING METHOD	In Class (Face to Face)	
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	Learning process supported by the e-class platform: course description, provision of material, announcements, messages, assignment/submission of activities, provision of feedback, discussions concerning the activities/assignments Email communication Live transmission of lectures Ability to track recorded lectures Utilization of Specialized Software during labs	
TEACHING ORGANIZATION <i>Describe in detail the way and methods of teaching:</i> Enhanced Lectures, Online Lectures, Seminars, Tutorial, Laboratory, Laboratory Exercise, Study & analysis of literature, Practice (Positioning), Interactive teaching, Developing a project, Individual / group work Telework (reference to tools) etc. <i>Details of the student's study hours for each learning activity and hours of non-guided study are shown to ensure that the total workload at the semester corresponds to the ECTS</i>	The theoretical part of the course is taking place in a typical classroom using slides, videos and teaching methods that promote students active involvement and the elicitation of their prior knowledge such as brainstorming, Q & A, discussion and activities to introduce them in the subject. The practical part is taking place in a lab where dedicated software is used. The students are engaged in role-play techniques and case studies aiming to acquire knowledge to treat various conditions in school, attend and comment on microteachings, use computer-based educational tools / environments to cultivate creativity, peer review microteaching designs. Students implement their own microteaching in 2 phases: the initial design is presented and discussed in the whole classroom, revisions are made and then microteaching is taking place. The microteaching is recorded and kept in the student's digital portfolio. The student self-assesses her/his microteaching and reflects upon the feedback s/he receives.	
	Activity	Student Workload (hours)

	Lectures	26
	Laboratory	26
	Completion of lab activities	18
	Observation and commentary on microteaching	10
	Study	20
	Personal assignment (design of microteaching in 2 phases, performance, self-assessment, reflection)	50
	Total Course	150
ASSESSMENT OF STUDENTS <i>Description of the assessment process</i> <i>Assessment Methods, Formative or Concluding, Multiple Choice Test, Quick Response Questions, Test Development Questions, Problem Solving, Written Work, Report / Report, Oral Examination, Public Presentation, Laboratory Work, Other / Other</i> <i>Fully defined evaluation criteria are mentioned and if and where they are accessible to students.</i>	In the framework of the course formative and summative assessment is followed. For each lab activity, feedback is provided to each student. As feedback to the microteaching, they receive oral comments by all participants and dedicated form filled by the educator. The feedback is provided through eclass.	
	Assessment methods	Number
	Activities	9
	Microteaching	1
		80%

LITERATURE AND STUDY MATERIALS / READING LIST

Προτεινόμενα συγγράμματα:

Καψάλης, Γ. Αχ. & Βρεττός, Γ. (2002). Μικροδιδασκαλία και άσκηση διδακτικών δεξιοτήτων. Αθήνα: Ατραπός.

Φλουρής Γ. (2000). Η αρχιτεκτονική της διδασκαλίας και η διαδικασία της μάθησης. Αθήνα: Εκδόσεις Γρηγόρη.