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) **K** | **E1** | **E2** | **E3** | **E4** | **E5** | **E6** *Fill the table as in the curriculum:* Track (A-Computer Science, B- Computer Engineering) / Specialization Compulsory (Y) / Core Specialization (B)/ Elective Specialization (E)						
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

<table>
<tr><th colspan="2">TEACHING AND LEARNING METHODS - ASSESSMENT</th></tr>
<tr><td>TEACHING METHOD</td><td>In Class (Face to Face)</td></tr>
<tr><td>USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES</td><td>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</td></tr>
<tr><td>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),</td><td>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></table></td></tr>
</table>

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*	Tutorial (attendance) 13 Independent Study of exercises 48 Independent Study of theory 42 Laboratory 8 ***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. 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***	***Percentage***
Written examination	1	80%
Laboratory examination	1	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)