INSTITUTION	NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS						
SCHOOL	SCHOOL OF SCIENCE						
DEPARTMENT	INFORMATICS AND TELECOMMUNICATIONS						
COURSE LEVEL	UNDERGRADUATE						
COURSE TITLE	**Electromagnetics - Optics and Modern Physics**						
COURSE CODE	**K12**		**Semester**	**2**	**ECTS**	**8**	
TEACHING HOURS per week	**THEORY**	**6**	**SEMINAR.**	**2**	**LABORATORY**		
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/D17/
EXPECTED PRIOR KNOWLEDGE/ PREREQUISITES AND PREPARATION:	NO
TEACHING AND EXAMINATIONS LANGUAGE:	GREEK
THE COURSE IS OFFERED TO ERASMUS STUDENTS	NO

COURSE CONTENT

CONTENT

1. Electrical charge, potential and electric field,
2. capacitance and dielectrics
3. Electric current, resistance and electromotive force
4. Moving charges and magnetic field,
5. Induction-self induction
6. DC circuits, AC current, R-L-C circuits
7. Maxwell equations and basic E / M, wave equation, Poynting vector
8. Nature and propagation of light
9. Geometric optics (mirror lenses), optical instruments,
10. Constructive and destructive Interference, diffraction and applications
11. Special Theory of Relativity
12. Stability of light velocity and inertial systems
13. Length Conversion and Time Expansion

14. Lorentz Transformations
15. From Newton to Plank
16. Material waves
17. The Schrödinger equation
18. The structure of matter

STUDENT LEARNING OBJECTIVES
The course is an introduction to electromagnetics, as a basis for scientists and engineers working in Computer Science and Computer and Telecommunications Engineering. Basic concepts in Electrostatics, Magnetostatics, Maxwell equations and electromagnetic waves are taught. Also the basic principles of geometric and wave optics are presented, as well as the principles of the special theory of relativity and quantum mechanics. The latest are required to understand the developments in telecommunications and computer science. Fundamentals on electrical currents and circuits theory are also introduced. Upon successful completion of the course, the students will be able to: • use the principles of electromagnetic theory in solving problems • identify and describe the most important functions of telecommunication devices (eg. antennas, quantum laser devices). • mention the principles of modern telecommunications (optical systems - optical fibers) and information (quantum computers) 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 (Discussions, Announcements, Task assignments, Student groups) Email communication Live transmission of lectures Ability to track recorded lectures Utilization of Specialized Software - applets
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	78
Tutorial	26
Laboratory	-
Teamwork in a case study	
Small individual exercises	10
Independent Study	80
Bibliography analysiis	6
Total Course	***200***

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	***(25 hours of workload per unit of credit)***	
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 includes: Two initial written assessments (progresses) made on selected parts of the subject, in the form of MCQs and short questions and the final - recapitulative written examinations, including closed or open-ended questions and Problems . The evaluation is done in the Greek language	

Assessment methods	***Number***	***Percentage***
Written examination	1	80%
Progress	2	20%

LITERATURE AND STUDY MATERIALS / READING LIST

The bibliography is in Greek and it is based on related English literature

- *H.D. Young, Φυσική, Τόμος Β', Ηλεκτρομαγνητισμός - Οπτική - Σύγχρονη Φυσική, Μετάφραση και Επιμέλεια από ομάδα Πανεπιστημιακών, Εκδόσεις Παπαζήση.*
- *Giancoli, Φυσική για Επιστήμονες και Μηχανικούς, Τόμος 2, Εκδόσεις Α. Τζιόλα & Υιοί Α.Ε*
- *Serway, Physics for Scientists and Engineers, Τόμος ΙΙ, Ηλεκτρομαγνητισμός. Απόδοση στα Ελληνικά: Λ. Ρεσβάνης*