COURSE OUTLINE

(1) GENERAL

SCHOOL	FACULTY OF SCIENCES		
ACADEMIC UNIT	PHYSICS		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	**62**	**SEMESTER**	**6**
COURSE TITLE	CLASSICAL ELECTRODYNAMICS II		

INDEPENDENT TEACHING ACTIVITIES *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits*	**WEEKLY TEACHING HOURS**	**CREDITS**
	4	7
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	Special background
PREREQUISITE COURSES:	
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes
COURSE WEBSITE (URL)	http://ecourse.uoi.gr/course/view.php?id=792

(2) LEARNING OUTCOMES

Learning outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.

Consult Appendix A

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

This course provides the undergraduate student with advanced knowledge in understanding the principles and dynamic phenomena of electromagnetism that occur in the case of time-varying sources (local charges and currents). In addition, this course equips the students with the necessary mathematical knowledge for a detailed and accurate description of these phenomena and for solving related problems. After a successful completion of the course, the student must be in a position to

- have a unified surveillance of electromagnetic phenomena and be engaged to draw qualitative conclusions about them by managing a small number of physical concepts and laws
- be able to make a mathematical description of electromagnetic phenomena based on basic physical quantities through the fundamental equations of electromagnetism (Maxwell equations)
- attack problems in electrodynamics through, somewhat advanced level mathematics, and resolving them through the fundamental equations
- acquire a sense of unity in physics at a fundamental level by embracing the

concepts of special relativity as emerged through the laws of electrodynamics and equipped with the necessary mathematical concepts to be able to solve relative problems.

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology	*Project planning and management*
Adapting to new situations	*Respect for difference and multiculturalism*
Decision-making	*Respect for the natural environment*
Working independently	*Showing social, professional and ethical responsibility and sensitivity to gender issues*
Team work	*Criticism and self-criticism*
Working in an international environment	*Production of free, creative and inductive thinking*
Working in an interdisciplinary environment	*……*
Production of new research ideas	*Others…*
	…….

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

(3) SYLLABUS

Electromagnetic induction. Maxwell equations. Scalar and vector potential. Electromagnetic energy. Poynting vector. Energy conservation and Poynting's theorem. Radiation. Multipole expansion. Electric and magnetic dipole radiation. Electromagnetic stress tensor. Conservation of momentum and angular momentum in electrodynamics. Electromagnetic waves. Laws of optics. Transmission of EM waves in conductors. Waveguides. Principles of special relativity. Lorentz transformations. 4-vector notation. Writing Maxwell's equations with 4-vectors. Electric and Magnetic fields viewed from different inertial frames.

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	**Use of ICT teaching (Moodle) for notes, references, communication with students.**

TEACHING METHODS

The manner and methods of teaching are described in detail.
Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.

The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS

Activity	*Semester workload*
Lectures	39
Tutorials	13
Study and analysis of bibliography	90
Non-directed study	30
Examinations	3

	Course total	***175***
STUDENT PERFORMANCE EVALUATION *Description of the evaluation procedure* *Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Specifically-defined evaluation criteria are given, and if and where they are accessible to students.*	Written examinations : an intermediate and a final one	

(5) ATTACHED BIBLIOGRAPHY

- Suggested bibliography:
- Related academic journals:

1) D. Griffiths, Introduction to Electrodynamics, translated in greek (2004)
2) K. Tamvakis, Classical Electrodynamics, Liberal Books (2012)
3) G.L. Pollack and D. R. Stump, Electromagntism, , Pearson (2005)
4) J.D. Jackson, Classical Electrodynamics, Willey (1998