COURSE OUTLINE

(1) GENERAL

SCHOOL	School of Science		
ACADEMIC UNIT	Physics		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	**10YKO03**	**SEMESTER**	**3**
COURSE TITLE	**PHYSICS III**		

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**
Lectures (theory and exercises)	6	7

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	Special Background
PREREQUISITE COURSES:	No
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes, in the English language for Erasmus students
COURSE WEBSITE (URL)	*https://eclass.uoa.gr/courses/PHYS113/*

(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*

The course aims to introduce the fundamental principles of Electromagnetism.

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

• Understand the concept of electrical and magnetic field as well as the physics quantities describing it (electric and magnetic field, potential, potential difference, field lines)

• Be able to deal with electrostatic and magnetostatic problems for continuous linear, surface and volume densities of charges and currents using Coulomb, Gauss, Biot-Savart, and Ampère laws. Be able to calculate the field strength, potential and potential difference, and total energy of the system.

• Understand the moving charge as a source of magnetic fields and the varying magnetic field as an electric field source. Be able to solve induction problems in electric circuits with varying magnetic fluxes, and with moving charge distributions.

• Through the integral and differential form of Maxwell's equations to understand the first unification of forces in Physics, and the concept of the electromagnetic field. To be able to solve simple problems.

• Have a qualitative understanding of the propagation of an electromagnetic field and be able to solve simple 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
Adapting to new situations
Decision-making
Working independently
Team work
Working in an international environment
Working in an interdisciplinary environment
Production of new research ideas
Project planning and management
Respect for difference and multiculturalism
Respect for the natural environment
Showing social, professional and ethical responsibility and sensitivity to gender issues
Criticism and self-criticism
Production of free, creative and inductive thinking
……
Others…
…….

The course aims at the following general competences

Search for, analysis and synthesis of data and information, with the use of the necessary tools
Adapting to new situations
Decision-making
Working independently
Production of free, creative and inductive thinking
Analytical and synthetic thinking
Critical thinking
Taking initiative/responsibility
Creativity
Determination
Meeting Deadlines and Keeping Schedules
Flexibility / Adaptability
Problem solving

(3) SYLLABUS

- Electric charge, Coulomb law, electric field, dynamic lines, potential, potential difference, insulated conductor. Law Gauss, examples

- Spherical shell field. Capacity, capacitors. Current, resistance, Ohm law. Magnetic field, Laplace force, power in conductor, applications.

- Current as the source of the magnetic field, Biot-Savart law. Law Ampère, applications

- Induction, Faraday law, coefficient of induction. Circuit RL, RLC, mechanical oscillator analogy.

- Maxwell laws in complete and differential form. Electromagnetic field energy, Poynting vector.

- Qualitative explanation of the propagation of an electromagnetic field, electromagnetic waves.

(4) TEACHING and LEARNING METHODS - EVALUATION

<table>
<tr><td>DELIVERY
Face-to-face, Distance learning, etc.</td><td>Face-to-face</td></tr>
<tr><td>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY
Use of ICT in teaching, laboratory education, communication with students</td><td>Yes

Electronic communication with the students using ICT (Information and Communications Technology)
Computer-aided lectures, use of Overhead Projectors, eclass platform</td></tr>
<tr><td>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</td><td>
<table>
<tr><th>Activity</th><th>Semester workload</th></tr>
<tr><td></td><td></td></tr>
<tr><td>Lectures</td><td>(13weeks x 4hours/week =) 52 hours</td></tr>
<tr><td>Exercises</td><td>(13weeks x 2hours/week =) 26 hours</td></tr>
<tr><td></td><td></td></tr>
<tr><td>Individual Study/ Study and Analysis of bibliography / Preparation</td><td>94</td></tr>
<tr><td>Written exams</td><td>3</td></tr>
<tr><td>Course Total</td><td>175</td></tr>
</table>
</td></tr>
<tr><td>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.</td><td>Final written exam in Greek, with problem solving covering the entire course.

Oral examinations where required.</td></tr>
</table>

(5) ATTACHED BIBLIOGRAPHY

1	Θερμοδυναμική Πανεπιστημιακή Φυσική, Τόμος ΙΙ, Ηλεκτρομαγνητισμός	ALONSO FINN, Μετάφραση Α.Κ. Ραπτόπουλος, Τ.Α. Φίλιππας	ΕΚΔΟΣΕΙΣ ΚΟΡΦΙΑΤΗΣ	1979	Αθήνα
2	Πανεπιστημιακή Φυσική με σύγχρονη Φυσική, Τόμος Β	Hugh D. Young, Freedman R.	ΕΚΔΟΣΕΙΣ ΠΑΠΑΖΗΣΗ	2010	Αθήνα
3	Φυσική, Μέρος ΙΙ	HALLIDAY-RESNICK	Α.Γ. ΠΝΕΥΜΑΤΙΚΟΣ Επιστημονικές και Τεχνολογικές Εκδόσεις	1992	Αθήνα
4	Φυσική για επιστήμονες και μηχανικούς Τόμος ΙΙ	D.C. Giancoli (Επιμέλεια: Α.Κεχαγιάς, Κ. Σφέτσος, Γ.Τσιπολίτης)	ΕΚΔΟΣΕΙΣ ΤΖΙΟΛΑ	2011	Θεσ/κη
5	Φυσική Τόμος ΙΙ 1η Έκδοση	D.Halliday, R. ResnicK, J. Walker. Κ. Παπανικόλας, Α. Καραμπαρμπούνη Σ. Κανέλ, Π. Σπυράκης, Ε. Στυλιάρης, Π. Τζανετάκης Γ. Τζαμπίρης	Γ. ΔΑΡΔΑΝΟΣ& ΣΙΑ Ε.Ε.	2013	Αθήνα