COURSE OUTLINE

(1) GENERAL

SCHOOL	ENGINEERING			
ACADEMIC UNIT	COMPUTER ENGINEERING AND INFORMATICS DEPARTMENT			
LEVEL OF STUDIES	UNDERGRADUATE			
COURSE CODE	NY105		SEMESTER	1st
COURSE TITLE	PHYSICS			
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		4		4
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		Total		4
COURSE TYPE *general background, special background, specialised general knowledge, skills development*	General background Specialized general knowledge			
PREREQUISITE COURSES:	None)			
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek			
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes			
COURSE WEBSITE (URL)	https://eclass.upatras.gr/courses/CEID1070/			

(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*

Learning Objectives

Students will learn to

- Use Coulomb's law to calculate the electric force between charges..
- Calculate the electric field due to a collection of charges.
- Determine the amount of charge within a closed surface from the electric field on that surface.
- How to use Gauss's law to calculate the electric field due to a symmetrical charge distribution.
- How to calculate the electric potential that a collection of charges produces at a point in space.
- How to use electric potential to calculate the electric field.
- How to analyze capacitors connected in a network.
- What dielectrics are, and how they make capacitors more effective.
- How to calculate the resistance of a conductor from its dimensions and its resistivity.
- How to do calculations involving energy and power in circuits.
- How to analyze circuits with multiple resistors in series or parallel.
- How to analyze circuits that include both a resistor and a capacitor.
- How magnetic field lines are different from electric field lines.
- How to analyze magnetic forces on current-carrying conductors.
  How current loops behave when placed in a magnetic field.

- How to calculate the magnetic field produced by a long, straight, current-carrying wire.
- How to use Ampere's law to calculate the magnetic field of symmetric current distributions.
- How to determine the direction of an induced emf.
- The four fundamental equations that completely describe both electricity and magnetism.
- How to relate the induced emf in a circuit to the rate of change of current in the same circuit.
- How to describe the propagation of a sinusoidal electromagnetic wave.
- What determines the amount of power carried by an electromagnetic wave.

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…
…….

Working Independently
Working in an international environment
Working in an interdisciplinary environment

(3) SYLLABUS

Electricity and Magnetism

- **Electric Fields**
  - Coulomb’s Law- Electric Field Lines - Electric Flux - Gauss’s Law
  - Application of Gauss’s Law to Various Charge Distributions
  - Conductors in Electrostatic Equilibrium
- **Electric Potential and Potential Difference**
  - Potential Energy Due to Point Charges- Electric Potential Due to a Charged Conductor
  - Obtaining the Value of the Electric Field from the Electric Potential
- **Capacitance and Dielectrics**
  - Calculating Capacitance- Combinations of Capacitors
  - Energy Stored in a Charged Capacitor - Capacitors with Dielectrics
  - Electric Dipole in an Electric Field
- **Current and Resistance**
  - A Model for Electrical Conduction- Resistance and Temperature - Electrical Power
- **Direct-Current Circuits**
  - Electromotive Force - Resistors in Series and Parallel - RC Circuits - Electrical Safety.
- **Magnetic Fields and Forces**
  - Charged Particles Moving in a Magnetic Field - Magnetic Force Acting on a Current
  - Torque on a Current Loop
- **Sources of the Magnetic Field**
  - Ampère’s Law - Magnetic Force Between Two Parallel Conductors - Gauss’s Law
- **Faraday’s Law of Induction**
  - Motional emf - Lenz’s Law - Induced emf and Electric Fields - Generators and Motors
- **Self-Induction and Inductance**
  - RL Circuits- Energy in a Magnetic Field- Mutual Inductance - LC Circuit - RLC Circuit
- **Electromagnetic Waves**
  - Maxwell’s Equations- Poynting vector – Intensity - Plane 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>Extended use of ICT. Specifically:
• There are electronic links with Lecture notes (in Greek)
• Main communication with the students is contacted via emails, and all announcements of the course are via eclass.</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>Lectures</td><td>32 hours</td></tr>
<tr><td>Tutorials</td><td>16 hours</td></tr>
<tr><td>Study and analysis of bibliography</td><td>50 hours</td></tr>
<tr><td>Final Exams</td><td>3 hours</td></tr>
<tr><td>Course total</td><td>101 hours</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>The language of evaluation is Greek. The final evaluation is by a written exam (3 hours) at the end of the semester. This exam contains: problems solving, short-answer questions, and multiple choice questions. On the forms of final examination the credits of each problem or question are indicated on the side, and written explanations are given on the forms, in order to indicate the student how to present his/her solutions or answer the questions.
One week after the test, indicative solutions are provided via eclass and, after the announcement of the final marks, every student has given time to inspect his answers and rise up his/her objections on the marking.</td></tr>
</table>

(5) ATTACHED BIBLIOGRAPHY

- Suggested bibliography:
PHYSICS FOR SCIENTISTS AND ENGINEERS WITH MODERN PHYSICS, Eighth Edition, R.A. Serway and J.W. Jewett
UNIVERITY PHYSICS, YOUNG H.and FREEDMAD R., 11th EDITION, Pearson Education Inc
- Related academic journals:
- Engineering Science and Education Journal
- IEEE Transactions on Dielectrics and Electrical Insulation
- IEEE Transactions on Magnetics