COURSE OUTLINE

(1) GENERAL

SCHOOL	School of Science		
ACADEMIC UNIT	Department of Physics		
LEVEL OF STUDIES	Master of Science		
COURSE CODE		**SEMESTER**	**Summer**
COURSE TITLE	Topics of Basic Physics 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**
	3	5
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*	Course of General Background. Skills Development/Specialization on Teaching basic concepts of Physics (mainly level of Secondary Education) by applying modern methods, using virtual/simulated experiments and new technologies.
PREREQUISITE COURSES:	NO
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	YES
COURSE WEBSITE (URL)	

(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 objective of the Topics of Basic Physics II Course is to educate and train the graduate students in such a way that, by developping apropriate skills, they will become able to innovate in physics teaching as well as in relevant virtual (simulated) demonstration experiments. This will be achieved through practical training in specific subject areas, developping teaching skills on the use of virtual experiments, training on the use of new technologies in physics teaching, etc. Emphasis is placed on the basic concepts of general physics and their teaching (mainly for the level of Secondary Education) using, in addition to algebraic and trigonometric calculus, the advantages of modern technologies. Special effort will be also put on providing the students with the best in teaching practices for identifying the alternative conceptions/misconceptions of students/pupils in the class and atempts to cure/replace them appropriately.

In this course, the gradute students are practiced (1) on choosing in teaching (i) Exemplary questions, exercises and physical problems, suitable for deep understanding by the pupils of the new physical concepts offered, (ii) Questions and exercises suitable for student assessment (in oral and written examination), and (2) on developping systematic problem-solving strategies. Towards the above objectives, students are guied on utilizing in their short presentations (see below) virtual experiments (by adopting MODELUS software), conceptual mapping (with the help of the Cmap Tools Software) and on the creation of virtual experiments as well as concept

maps in various topics of basic physics.

The Graduate Students are educated to aquire the above specializations and are practiced rotationally through presentations (micro-teachings of about 20-30 minutes) in PowerPoint, beamer, etc. After these presentations, the difficulties in offering (within the context of Contemporary educational research) new physical concepts in the class, the approach of each module from pedagogical principles poin of view, the partial teaching objectives of each unity, etc., are noticed and discussed.

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, analyze and synthesize data and information related to physics concepts, using the necessary modern technologies. Autonomous work. Understanding the underlying scientific concepts in fundamental physical phenomena. Production of new virtual experiments. Working in an interdisciplinary environment.

(3) SYLLABUS

Thermal Physics. Thermodynamics. Electric charge and electrostatics. Electric field and electric Potential. Conductivity and resistivity. Current in closed circuits. Magnetic field. Electromagnetic induction. Aplications.

(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 laptop/projector in presentations (with power point and/or beamer) of conceptual physics topics and units, applications of modern educational research principles. The notes/exercises of the teacher are mostly written in LATEX. Use of MODELUS (to create animations, images, charts, figures, tables, etc., with the interactive objects of physical problems) and CmapTools software (to design concept maps).

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	13
Tutorials	39
Study/analysis of bibliography	19
Interactive teaching training	26
Essay writing	25
Examination	*3*
Course total	***125***

STUDENT PERFORMANCE EVALUATION
Description of the evaluation procedure

Language of evaluation, methods of evaluation, summative or conclusive, multiple choice

1). Weekly examination (in the class) through: (I) Solving problems at the blackboard, (ii) tutorials (ii) oral multiple choice questionnairs. Practical exercises during students' short presentations.
2). Final, Total-written examinations.

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.*	3) Final presentations of a module in one teaching hour.

(5) ATTACHED BIBLIOGRAPHY

- Suggested bibliography:
- Related academic journals:

1). Physics for Scientists and Engineers: A Strategic Approach with Modern Physics and Mastering Physics, R.D. Knight, 2nd Edition, Benjamin Cummings, 2007.
2). Πέντε Εύκολα Μαθήματα, R.D. Knight, Μετάφραση Π.Γ. Τζαμαλής, Εκδόσεις ΔΙΑΥΛΟΣ, Αθήνα, 2006.
3). Οι έννοιες της φυσικής, P.G. Hewitt, Μετάφραση Ε. Σηφάκη και Ι. Παπαδόγγονα, Πανεπιστημιακές Εκδόσεις Κρήτης, 2011.
4) Φυσική, Μέρος ΙΙ, D. Halliday, R. Resnick, J. Walker, Εκδόσεις Gutenberg, 2012.
5). Οι διαλέξεις Φυσικής του Feynman, Τόμος Α & Β, Feynman - Leighton – Sands, Εκδόσεις ΤΖΙΟΛΑ, Αθήνα, 2009.
6). Η φυσική σήμερα, Τόμος Ι 'Τα θεμέλια', Ε.Ν. Οικονόμου, Πανεπιστημιακές Εκδόσεις Κρήτης, Τρίτη έκδοση, Ηράκλειο, 1995.