COURSE OUTLINE

(1) GENERAL

SCHOOL	SCIENCE		
ACADEMIC UNIT	DEPARTMENT OF PHYSICS		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	305	**SEMESTER**	7
COURSE TITLE	CONCEPTUAL PHYSICS AND TEACHING EXPERIANCE IN 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**
	4	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*	Skills development
PREREQUISITE COURSES:	No
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes
COURSE WEBSITE (URL)	https://ecourse.uoi.gr/course/view.php?id=1777

(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 primary objective of the course is the in-depth understanding of the basic concepts of Physics and their teaching to secondary school students using experiments and new technologies.

After successful completion of the course, the student:

- will have gained knowledge in the popularization and teaching of the basic concepts of Physics such as: Mechanics-Newton Laws-Momentum-Energy-Gravity, Matter Properties, Heat, Sound-Oscillations-Waves, Electromagnetism, Nuclear-Particle Physics and Relativity.
- will be able to develop physics experiments on education (special didactic experiments) and presentation of natural phenomena.
- will be able to present selected topics and experiments in Physics using new technologies to groups of first-year students or to groups of secondary school students.

- will have completed their practice in teaching either by teaching in secondary education institutions or by teaching in the Department's Demonstration Experiment Room to visiting students.

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,
- Production of free, creative and inductive thinking
- Exercise in the popularization of difficult to understand scientific concepts

(3) SYLLABUS

Physical Sciences. Scientific method. Theory-Experiment. Concepts of Physics: Mechanics-Newton Laws-Momentum-Energy-Body movement-Gravity-Nature of matter. Properties of matter: solids, liquids, gases and plasma, temperature-dilation. Heat: propagation, phase change, thermodynamics. Sound: oscillations, waves sound, musical sound. Electricity and Magnetism: electrostatics, electric current, magnetism, induction. Light: property, color, reflection, refraction, light waves, emission-light propagation, light quanta. Atomic-Nuclear-Particle Physics: the atom and the quantum, nucleus and radioactivity, fission and fusion, nuclear interactions, basic structure of matter, accelerators and detectors. Relativity: special theory of relativity, general theory of relativity. Experimentation of students and practical training in teaching using new technologies. Practical training with experiments on education (special didactic experiments), presentation of experiments to groups of first year students and groups of secondary school students.

(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 in teaching and communication with students. • The University's asynchronous distance learning **ecourse** system is used to provide notes, exercises and assignments. • Communication with students outside of class is mainly via email.
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 (with student activation for participation in the course)	40
Study and analysis of bibliography	32
Preparing a physics topic for teaching	50
Physics topic presentation - Exams	3
Course total	***125***

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 exams at the middle and the end of the semester which include multiple choice questionnaires. • Special topic assignment with required public presentation at the end of the course

(5) ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

1. HEWITTG. PAUL, ΟΙ ΕΝΝΟΙΕΣ ΤΗΣ ΦΥΣΙΚΗΣ, Πανεπιστημιακές Εκδόσεις Κρήτης 2009.
2. B. Crowell, Conceptual Physics, https://reader.bookfusion.com/books/146998-conceptual-physics.