COURSE OUTLINE

(1) GENERAL

SCHOOL	School of Sciences		
ACADEMIC UNIT	Department of Physics		
LEVEL OF STUDIES	School of Sciences		
COURSE CODE	**M315**	**SEMESTER**	**1**
COURSE TITLE	Physics Experiments in Education I		

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*	special background, specialised
PREREQUISITE COURSES:	
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 course provides to the postgraduate students specialized knowledge required for the: preparation, presentation, demonstration and analysis of classical physics experiments in the fields of mechanics and heat. Particular emphasis is given to the use and application of modern technologies on the presentation and demonstration of the experiments, as well as on the experimental data analysis and interpretation.

Especially, after the successful competence of the course the students are expected to be in position to:

- select and prepare the appropriate experimental apparatus, instruments and setups for the conduction of basic physics experiments in the field of mechanics and heat, oriented to pupils of the secondary level education and undergraduate physics students that have been or are in the course of being taught the corresponding material in lectures
- present the scope and guide the pupils-students to the conduction of the experiments by suggesting, demonstrating and applying the appropriate procedures
- provide guidance for the appropriate collection of experimental data and their consequent analysis and interpretation, as well as for the extraction of the corresponding conclusions
- to be in position of resolving questions and issues raised by the pupils-students regarding the procedure of conducting physics experiments, as well as analyzing and interpreting the experimental data

• to suggest an introduce new methods and experiments or procedures for conducting experiments in the fields of mechanics and heat, including appropriate quantitative measurements of physical quantities or suggesting novel demonstration experiments in the same fields.

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, analyse and compile data and information, with the use of the necessary technology.
Decision-making.
Working independently.
Working in an interdisciplinary environment.
Production of free, creative and inductive thinking.

(3) SYLLABUS

Physics experiments in the fields of mechanics and heat: Simple pendulum. Linear constant velocity motion, linear constant acceleration motion.Newton's second law. Work-energy theorem, conservation of mechanical energy. Impulse-momentum theorem, momentum conservation and collisions.Hooke'slaw, spring constant measurement, measurements of combination of spring setups (in-line, parallel). Periodic motion, simple harmonic oscillator motion, period-mass relation in the simple harmonic oscillator. Study of damped oscillation, forced oscillations and resonance. Study of rigid body rotational motion, measurement of the moment of inertia. Horizontal projectile motion. Hydrostatics-measurement of the density of solids and liquids. Hydrodynamics-measurement of the viscosity of glycerin. Linear thermal expansion of solids. Novel experiments demonstration.

(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*	The students prepare their presentations with the support of their instructor and they are responsible for presenting the theoretical background, introduction, demonstration and interpretation of the experiments. The presentation is conducted by computer and projector. Computers are also used for the analyses and interpretation of the experimental data. The Moodle asynchronous e-learning system is used for dissemination of notes, exercises and communication between the students and the instructor.
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***
Laboratory practice	39
Study and analysis of bibliography	26
Non-instructive studies	26
Interactive teaching	13
Filed work	5
Essay writing	13
Exams	3
Course total	**125**

STUDENT PERFORMANCE EVALUATION *Description of the evaluation procedure*	The final mark results from the combination of the evaluation of the preparation, presentation, guidance, conduction and analysis of the experiments curried out in each laboratory

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.*	exercise, the evaluation of the written essays, as well as the evaluation of the presentation of a demonstration experiment in the field of mechanics and heat at the end of the course.

(5) ATTACHED BIBLIOGRAPHY

- Suggested bibliography:
- Related academic journals:

1. Μ. Καμαράτος "Εισαγωγή στην ανάλυση πειραματικών μετρήσεων, απλά πειράματα μηχανικής-θερμότητας", Τυπογραφείο Πανεπιστημίου Ιωαννίνων, Ιωάννινα 2015.
2. D. Halliday, R. Resnick, J. Walker, "Fundamentals Of Physics" 10th eddition, John Wiley & Sons, 2014.
3. American Journal of Physics (American Association of Physics Teachers, USA)
4. Physics Education (Institute of Physics, UK)