COURSE OUTLINE

1. GENERAL

SCHOOL	NATURAL SCIENCES		
DEPARTMENT	MATHEMATICS		
LEVEL OF COURSE	UNDERGRADUATE		
COURSE CODE	MAT_AM468	**SEMESTER OF STUDIES**	8th
COURSE TITLE	INTRODUCTION TO MODERN 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*	**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
Lectures and Tutorials	4	6
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*	Elective course
PREREQUISITE COURSES:	Recommended prerequisite knowledge: CALCULUS I – III, REAL ANALYSIS I, INTRODUCTION TO ORDINARY DIFFERENTIAL EQUATIONS, SECOND COURSE IN ORDINARY DIFFERENTIAL EQUATIONS
TEACHING AND ASSESSMENT LANGUAGE:	Greek
THE COURSE IS OFFERED TO ERASMUS STUDENTS	No
COURSE WEBPAGE (URL)	https://eclass.math.upatras.gr/courses/MATHDEP228/

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*

With this course students will be introduced to Physics, from Classical Mechanics to the modern theories of Special Relativity and Quantum Mechanics.

Upon successful completion of the course, students are familiar with the use and application of mathematical theoretical models in problems of Classical Physics, Hamiltonian Mechanics and Special Theory of Relativity. Thus, they acquire the ability to apply theories of Functional Analysis and Operator Theory, such as Lie groups, SU(2) and SO(3) groups, and Galileo and Poincaré groups, to address related problems in Mathematical Physics. .

Finally, the students will know the mathematical foundation of quantum mechanics and will be able to apply theory to solve other physical problems.

General Abilities

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	*Others…*
Production of new research ideas	

- Search, analyze and synthesize data and information, using the necessary technologies.
- Production of new research ideas.
- Respect for the natural environment.
- Promotion of free, creative and inductive thinking.

3. COURSE CONTENT

Elements of Special Relativity. Quantum theory of matter. Statistical Physics. The Meaning of Symmetry in Physics – Lie Algebras and Groups. Atomic and nuclear structure. Elementary particles - Fundamental forces.

4. TEACHING AND LEARNING METHODS - ASSESSMENT

TEACHING METHOD *Face-to-face, Distance learning, etc.*	Lectures (face to face)
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES *Use of ICT in teaching, laboratory education, communication with students*	Support of the course via the online platform *eClass* of the Department of Mathematics.
TEACHING ORGANIZATION *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*	
STUDENT ASSESSEMNT *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.*	**Assessment Language:** Greek **Assessment Language for Erasmus students:** --- **Assessment methods:** Written final examinations. Minimum passing grade: 5 Maximum passing grade: 10

Activity	***Semester workload***
Lectures	35
Tutorials	25
Private study of the student	87
Final Examinations	3
Total number of hours for the Course (25 hours of work-load per ECTS credit)	***150***

5. RECOMMENDED LITERATURE

(*in Greek*)

- Serway Raymond A., Moses Clement J. and Moyer Curt A. *Σύγχρονη Φυσική*. Εκδόσεις ΙΤΕ – Πανεπιστημιακές Εκδόσεις Κρήτης, 2009.
- Beiser Arthur. *Σύγχρονη Φυσική*. Εκδόσεις Gutenberg, 2001.
- Στρέκλας Αντώνης. *Εισαγωγή στην Σύγχρονη Φυσική*. Σημειώσεις μαθήματος, 2000.