COURSE OUTLINE

(1) GENERAL

SCHOOL	School of Science		
ACADEMIC UNIT	Physics		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	**11**	**SEMESTER**	**1**
COURSE TITLE	Mechanics		

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	5	7
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*	General background
PREREQUISITE COURSES:	
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes
COURSE WEBSITE (URL)	http://ecourse.uoi.gr/course/view.php?id=1386 http://ecourse.uoi.gr/course/view.php?id=145

(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 purpose of the course is for the students to understand the meaning of several physical quantities related with the motion of mass points as well as rigid bodies. Such quantities are the displacement, the velocity, the acceleration, the inertial mass, the force, the work, the energy, the momentum, the torque and the angular momentum. In addition, the student will learn to apply the three Newton's laws, the law of universal gravitation, the conservation laws of energy, momentum and angular momentum, in order to solve problems and explain phenomena of the everyday life. More specifically, after the successful attendance of the course, the student will be able:

- to know and understand in depth, the basic concepts, principles and laws related with the kinetics of dimensionless particles, three-dimensional objects and fluids. To apply this knowledge in solving problems.
- To use basic elements of vectors, differentials and integrals, in order to study the position, the velocity and the acceleration of moving bodies.
- To explain and understand how the laws of energy and momentum conservation are related with the Newton's laws.

- To apply the laws of energy, momentum and angular momentum conservation in solving problems of dynamics.
- To apply the laws of Mechanics in fluids for solving problems.

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 for analysis and synthesis of data and information, with the use of the necessary technology.
Working independently and team work.
Production of free, creative and inductive thinking.

(3) SYLLABUS

Physical models, measurements and systems of units of measurement. Vectors and their properties. Motion in one dimension. Movement in plane and space. The dynamics of particles. Newton's three laws. Work and energy. Conservation laws of energy and momentum. Elastic and plastic collisions. Kinematics and dynamics of rotation. The conservation of the angular momentum. Equilibrium and elasticity of solid bodies. Harmonic, damped and driven oscillations. The law of the universal gravitation. Fluid mechanics.

(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 the e-courses learning system, with uploaded notes, and exercises for practice and communication with students.
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*	
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*	Homework with problem solving and evaluation, on an almost weekly basis (20%). Midterm exams (30%). Written exams at the end of the semester which concern the understanding of the theory and solving problems (50%). The percentage in parentheses is the contribution of each evaluation process to the final grade of the course.

Activity	***Semester workload***
Lectures	39
Tutorials	26
Study of bibliography	85
Non-directed study	20
Exams	5
Course total	**175**

Specifically-defined evaluation criteria are given, and if and where they are accessible to students.	

(5) ATTACHED BIBLIOGRAPHY

- "Πανεπιστημιακή Φυσική με Σύγχρονη Φυσική" Τόμος Α (4η Ελληνική Έκδοση) Μηχανική – Κύματα – Θερμοδυναμική. H.D. Young και R.A. Freedman. Μετάφραση από Ομάδα Πανεπιστημιακών. Εκδόσεις Παπαζήση ΑΕΒΕ 2022 Αθήνα.
- "Φυσική" Τόμος Α. D. Halliday, R. Resnick, J. Walker. 11η Έκδοση. Μετάφραση από Ομάδα Πανεπιστημιακών. Εκδόσεις Gutenberg 2021 Αθήνα.
- "Φυσική για Επιστήμονες και Μηχανικούς" Μηχανική - Ταλαντώσεις και μηχανικά κύματα – Θερμοδυναμική - Σχετικότητα (8η Αμερ. Έκδοση) Reymond R. Serway. John W. Jewett. Εκδόσεις Κλειδάριθμος 2012 Αθήνα.
- "Φυσική για Επιστήμονες και Μηχανικούς" Τόμος Α, Douglas C. Giancoli, (4η Εκδοση). Εκδόσεις Τζιόλα 2018 Θεσ/νίκη.