COURSE OUTLINE

1. GENERAL

SCHOOL	NATURAL SCIENCES		
DEPARTMENT	MATHEMATICS		
LEVEL OF COURSE	UNDERGRADUATE		
COURSE CODE	MAT_AM303	**SEMESTER OF STUDIES**	5th
COURSE TITLE	CLASSICAL 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*	**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
Lectures and Tutorials	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*	Background
PREREQUISITE COURSES:	Recommended prerequisite knowledge: CALCULUS I, II and III, REAL ANALYSIS I, INTRODUCTION TO ORDINARY DIFFERENTIAL EQUATIONS, LINEAR ALGEBRA I
TEACHING AND ASSESSMENT LANGUAGE:	Greek
THE COURSE IS OFFERED TO ERASMUS STUDENTS	Yes
COURSE WEBPAGE (URL)	https://eclass.upatras.gr/courses/MATH972/

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*

In this course the student acquires the ability to use mathematical techniques for the analysis of physical phenomena of fundamental mechanics, oscillations, central force fields and solid bodies.

By the end of this course, the student will have developed skill concerning the use and application of mathematical theoretical models and computational techniques for the interpretation and analysis of physical phenomena related to the dynamics and kinematics of bodies in space, as well the relative classical physical principles that govern them.

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.
- Decision making.
- Working in an interdisciplinary environment.
- Autonomous (independent) work.
- Production of new research ideas.
- Promote free, creative and inductive thinking.

3. COURSE CONTENT

Part one: Fundamental concepts of space-time. Transformations of Galileo in space-time. Motion in space and evolution in space-time. The Galilean principle of relativity (inertial reference systems). The Newton's Determinism (a fundamental equation of Classical Mechanics). Newton's laws and inertial forces. Non-inertial systems, related motions. Momentum, Rotation, Kinetic energy. Material points systems: mass center movement, Köning theorems.

Part two: Force fields. Potential and energy function. Work, Power, Moment and Energy Conservation. Oscillations (Harmonic, free and forced, pendulum). Motion in central force fields. The Law of Global Attraction and the Movement of Celestial Bodies.

Part Three: The state-space of solid bodies. The rotation operator and the Chasles-Euler theorem. The inertia operator and the Sylvester theorem. Ellipsoides of energy and angular momentum. Euler equation and study of motion of solid bodies.

In order to highlight the special educational and didactical aspects of a course, special emphasis is given on the historical evolution and scientific development of the subject as well as on its applications in technology and/or other sciences.

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*	Supporting learning through the online platform *eClass* University of Patras.
TEACHING ORGANIZATION *he 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	40
Tutorials	25
Solving suggested exercises	35
Personal study by the student	72
Final Exam	3
Total number of hours for the Course (25 hours of work-load per ECTS credit)	***175***

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:** English **Assessment methods** Written final course exam (100%) including exercises and problem solving. Minimum passing grade: 5 Maximum passing grade: 10

5. RECOMMENDED LITERATURE

(in Greek)

- Πνευματικός Σπυρίδων Ν. *Κλασική Μηχανική*. 2η Έκδοση, Εκδόσεις Α.Γ. Πνετματικού, 2006.
- Kibble Tom W.B. and Berkshire Frank H. *Κλασική Μηχανική*. 5η Έκδοση, Εκδόσεις ΙΤΕ – Πανεπιστημιακές Εκδόσεις Κρήτης, 2015.