COURSE OUTLINE

1. GENERAL

SCHOOL	NATURAL SCIENCES		
DEPARTMENT	MATHEMATICS		
LEVEL OF COURSE	UNDERGRADUATE		
COURSE CODE	MAT_AM469	**SEMESTER OF STUDIES**	8th
COURSE TITLE	DYNAMICAL ASTRONOMY		

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: CLASSICAL MECHANICS, ANALYTICAL MECHANICS
TEACHING AND ASSESSMENT LANGUAGE:	Greek
THE COURSE IS OFFERED TO ERASMUS STUDENTS	Yes
COURSE WEBPAGE (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*

By the end of this course the student gets basic knowledge of Astronomy (basic concepts, motions of the Earth, spherical trigonometry, time, calendars etc). Subsequebtly, he/she studies the problems of Celestial Mechanics:

- Motion in a Newtonian force field
- The two-body problem
- The n-body problem
- The three-body problem
- The restricted three-body problem.

Finally, the student learns how the Lagrange-Hamilton theory applies to the problems of Celestial Mechanics.

A student, who has successfully completed the course, will be able to:

- Recognize several astronomical phenomena (star-rise and star-set, stellar culminations, constellations, time measuring).
- Solve exercises related to various problems of Celestial Mechanics.
- Investigate the conditions under which a total collision may occur in an n-body problem.
- Locate equillibrium positions in the three-body problem and the restricted three-body problem.

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	

- Decision making.
- Retrieving, analyzing and synthesizing data.
- Autonomous work.
- Teamwork.
- Working in interdisciplinary environment.
- Respecting the physical environment.

3. COURSE CONTENT

Basic astronomical concepts. Motions of the Earth. Astronomical coordinate systems. Elements of Spherical Trigonometry. Defining and measuring Time, calendars. Solar System. N-body Problem (and various cases) in Dynamical Astronomy and, in particular, in Celestial Mechanics. The Lagrange-Hamilton theory for the Dynamical Astronomy problems. Principles of rocket theory and space travelling.

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*	
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*	

Activity	***Semester workload***
Lectures	52
Solving suggested exercises	39
Personal study by the student	56
Final examination	3
Total number of hours for the Course (25 hours of work-load per ECTS credit)	***150***

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 including: ✓ Comprehensive theory questions ✓ Problem solving Minimum passing grade: 5 Maximum passing grade: 10

5. RECOMMENDED LITERATURE

(*in Greek*)

- Ζαφειρόπουλος Βασίλειος. *Εικονογράφηση του Ουρανού*. Εκδόσεις Εταιρείας Αξιοποίησης και Διαχείρισης Περιουσίας Πανεπιστημίου Πατρών, 2012.
- Ζαφειρόπουλος Βασίλειος και Καρατζόγλου-Ζαφειροπούλου Φιλαρέτη. *Στους Μαγικούς Αστερισμούς*. Εκδόσεις Εταιρείας Αξιοποίησης και Διαχείρισης Περιουσίας Πανεπιστημίου Πατρών, 2013.
- Ζαφειρόπουλος Βασίλειος. *Πυραυλική*. Εκδόσεις Εταιρείας Αξιοποίησης και Διαχείρισης Περιουσίας Πανεπιστημίου Πατρών, 2013.
- Δανέζης Μάνος και Θεοδοσίου Στράτος. *Το σύμπαν που αγάπησα*. Εκδόσεις Δίαυλος, 2012.
- Shu Frank. *Αστροφυσική. Τόμος Ι*. Εκδόσεις ΙΤΕ – Πανεπιστημιακές Εκδόσεις Κρήτης, 2009.