COURSE OUTLINE

(1) GENERAL

SCHOOL	SCHOOL OF SCIENCES		
ACADEMIC UNIT	DEPARTMENT OF PHYSICS		
LEVEL OF STUDIES	GRADUATE		
COURSE CODE	**M123**	**SEMESTER**	**2**
COURSE TITLE	PLASMA 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*	**WEEKLY TEACHING HOURS**	**CREDITS**
	4	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*	Special background/specialised general knowledge/ skills development
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 deals with advanced principles and phenomena of Plasma Physics and provides an introduction to modern research areas and applications . Upon completion of the course, the student will be able to

- apply principles and methods of Plasma Physics
- practice with relevant MSc or PhD projects.

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 *Adapting to new situations* *Decision-making* *Working independently* *Team work* *Working in an international environment* *Working in an interdisciplinary environment* *Production of new research ideas*	*Project planning and management* *Respect for difference and multiculturalism* *Respect for the natural environment* *Showing social, professional and ethical responsibility and sensitivity to gender issues* *Criticism and self-criticism* *Production of free, creative and inductive thinking* *……* *Others…* *…….*

Search for, analysis and synthesis of data and information, with the use of the necessary technology.
Working independently.
Criticism and self-criticism.
Production of free, creative and inductive thinking.

(3) SYLLABUS

Models of magnetohydrodynamics (MHD), multi-fluids and kinetic theory. Two and three dimensional plasma equilibria in connection with the magnetic confinement systems. Grad-Shafranov equation and generalizations to flowing plasmas. Energy principle and linear MHD stability. Pressure and current driven instabilities. Linear stability of equilibria with flow. Non linear stability and the method of Lyapunov.

(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	
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* *Specifically-defined evaluation criteria are given, and if and where they are accessible to students.*	Written exam at the end of the course containing theory and problem solving.

Activity	***Semester workload***
Lectures	39
Tutorials	13
Bibliography study	67
Non-guided study	36
Guided study	17
Exams	3
Course total	**175**

(5) ATTACHED BIBLIOGRAPHY

Suggested bibliography :

- J. Freidberg, Ideal Magnetohydrodynamics , Cambridge University Press, 2014
- J. P. Goedbloed, Pony Stefans and Stefaan Poedts, Advanced

Magnetohydrodynamics, Cambridge University Press, 2010

- E. R. Priest, Solar Magnetogydrodynamics, D. Reider Publishing Company, 1982
- R. D. Hazeltine, J. D. Meiss, Plasma Confinement, Addison-Wesley (Frontiers in Physics), 1992.
- G. Bateman, MHD Instabilities, The MIT Press, 1978.
- G. Throumoulopoulos, Magnetohydrodynamics (with stability), 6th Fusion School of Plasma Physics and Technology, Volos 2006, Lecture notes, 2006.

Related academic journals:

Physical Review Letters, Physical Review E, Physics of Plasmas, Journal of Plasma Physics, Plasma Physics and Controlled Fusion, Nuclear Fusion.