

COURSE MODULE OUTLINE

General information

SCHOOL	SCHOOL OF SCIENCE AND TECHNOLOGY		
PROGRAM COURSE	ADVANCED STUDIES IN PHYSICS		
LEVEL OF STUDY	POSTGRADUATE		
COURSE UNIT CODE	PSF 50		1st
COURSE TITLE	ADVANCED STUDIES IN CLASSICAL PHYSICS		
INDEPENDENT TEACHING ACTIVITIES <i>in case credits are awarded for separate components/parts of the course, e.g. in lectures, laboratory exercises, etc. If credits are awarded for the entire course, give the weekly teaching hours and the total credits</i>		WEEKLY TEACHING HOURS	CREDITS
Weekly teaching hours 18 – 19 * 30 weeks		560	20 ECTS
<i>Add rows if necessary. The organization of teaching and the teaching methods used are described in detail under section 4</i>			
COURSE TYPE Compulsory, Optional, Optional mandatory	COMPULSARY		
PREREQUISITE COURSES:	The choice of PSF 50 has no prerequisites. However, the simultaneous attendance or completion of the 1 st , 2 nd year units are allowed		
LANGUAGE OF INSTRUCTION AND EXAMS:	GREEK		
THE COURSE IS OFFERED TO ERASMUS STUDENTS	No (due to annual duration of the unit)		
COURSE WEBSITE (URL)	https://www.eap.gr/education/postgraduate/annual/advanced-studies-in-physics/topics/#p50 Each module has its own space in the Learning Management System of EAP (http://study.eap.gr), with controlled access (use of code) for students and teaching staff.		

(2) LEARNING OUTCOMES

Learning Outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate (certain) level, which students will acquire upon successful completion of the course, are described in detail. It is necessary to consult:

APPENDIX A

- Description of the level of learning outcomes for each level of study, in accordance with the European Higher Education Qualifications' Framework.
- Descriptive indicators for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and

APPENDIX B

- Guidelines for writing Learning Outcomes

- Ability to formulate equations of motion of physical systems through Principles of Change
- Knowledge and comprehensive understanding of the time evolution of physical systems in configuration space through the solving of the corresponding Lagrange equations
- Knowledge and comprehensive understanding of the time evolution of physical systems in phase space through the solving of the Hamilton equations and/or through the formalism of Poisson curves.
- Knowledge and comprehensive understanding of the issues of small oscillations (Normal Modes).
- Ability to formulate Lagrange and Hamilton formalisms for Continuum Mechanics and Classical Field Theory systems.
- Ability to formulate Maxwell's equations for electrodynamics and their solution in various macroscopic systems.
- Knowledge of the emission and absorption of Electromagnetic Waves.
- Knowledge and comprehensive understanding of the electromagnetic properties of physical systems of Conductors, Dielectrics, and Materials with Magnetic Properties.
- Formulation and solution of the kinematics and electromagnetic behavior of physical systems in the context of the Special Theory of Relativity.
- Knowledge and comprehensive understanding of radiation phenomena of accelerated electric charges.

Unit Subjects:

- Advanced Studies in Classical Mechanics
- Advanced Studies in Classical Electromagnetism

General Competences

Taking into consideration the general competences that students/graduates must acquire (as those are described in the Diploma Supplement and are mentioned below), at which of the following does the course attendance aim?

<i>Search for, analysis and synthesis of data and information by the use of appropriate technologies,</i>	<i>Project planning and management</i>
<i>Adapting to new situations</i>	<i>Respect for diversity and multiculturalism</i>
<i>Decision-making</i>	<i>Environmental awareness</i>
<i>Individual/Independent work</i>	<i>Social, professional and ethical responsibility and sensitivity to gender issues</i>
<i>Group/Team work</i>	<i>Critical thinking</i>
<i>Working in an international environment</i>	<i>Development of free, creative and inductive thinking</i>
<i>Working in an interdisciplinary environment (Other.....citizenship, spiritual freedom, social awareness, altruism etc.)</i>	<i>.....</i>
<i>Introduction of innovative research</i>	

Search for, analysis and synthesis of data and information by the use of appropriate technologies,
Adapting to new situations
Decision-making
Individual/Independent work
Working in an international environment
Working in an interdisciplinary environment
Introduction of innovative research
Critical thinking
Development of free, creative and inductive thinking

(3) COURSE CONTENT

The T.U. aims to cover at the postgraduate level the fundamental “classical”, i.e., non-quantum, theories, in particular Classical (Newtonian) Mechanics, as expressed by Lagrange, Hamilton, etc., and Maxwell’s Classical Electrodynamics. The vast majority of macroscopic physical phenomena may be described by the laws in the aforementioned classical structure. However, even the description of microscopic phenomena based on Quantum Theory is impossible save through a “classic analog” (system). Thus, the quantum mechanical description of any physics system requires sound knowledge of Classical Mechanics and Electrodynamics. It must be noted that Classical Electrodynamics, i.e. the theory of macroscopic electromagnetic phenomena, also includes the Special Theory of Relativity. Only large-scale gravitational phenomena, which are described in the General Theory of Relativity, are not included in the aforementioned diptych, which offers a concise description of physical phenomena at macroscopic distances.

(4) TEACHING METHODS--ASSESSMENT

MODES OF DELIVERY <i>Face-to-face, in-class lecturing, distance teaching and distance learning etc.</i>	Distance education with five Group Counseling Meetings (OSS) during the academic year and on weekends.
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USE OF INFORMATION AND COMMUNICATION TECHNOLOGY <i>Use of ICT in teaching, Laboratory Education, Communication with students</i>	During Group Counseling Meetings, Remote meetings tools (cisco webex), Presentation software (e.g. white board, power point), Specialized databases in the subjects under study (eg. ATNF pulsar catalogue, NED extragalactic database, etc.) are used. Additionally, the students use office automation tools, web browsers and e-reader for digital books.	
COURSE DESIGN <i>Description of teaching techniques, practices and methods: Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, Internship, Art Workshop, Interactive teaching, Educational visits, projects, Essay writing, Artistic creativity, etc.</i> <i>The study hours for each learning activity as well as the hours of selfdirected study are given following the principles of the ECTS.</i>	Activity/Method	Annual workload
	6 OSS (* 4 hours)	24
	Preparation of Assignments (6 assignments * 10 hours)	60
	Examination	3
	Individual study	473
	Total unit workload (hours)	560
STUDENT PERFORMANCE EVALUATION/ASSESSMENT METHODS <i>Detailed description of the evaluation procedures:</i> <i>Language of evaluation, assessment methods, formative or summative (conclusive), multiple choice tests, short- answer questions, open-ended questions, problem solving, written work, essay/report, oral exam, presentation, laboratory work, other.....etc.</i> <i>Specifically defined evaluation criteria are stated, as well as if and where they are accessible by the students.</i>	Elaboration of written assignments during the academic year, the average of the grades of which participates in the formation of the final grade of unit by 30%, if there is a passable in the final or repetitive examinations. In the final written exams the grade of the written assignments participates in the formation of the final grade of unit by 70%. All the criteria are posted, both in each written assignment (in the LMS study.eap.gr), as well as in the general regulation of HOU at: https://www.eap.gr/education/study-regulations/	

(5) SUGGESTED BIBLIOGRAPHY:

- Suggested bibliography - Goldstein, Poole & Safko (2002), Classical Mechanics, International edition, Addison Wesley publishing - Jackson, J.D. (1998), Classical Electrodynamics, 3rd edition, Wiley publishers -Συναφή επιστημονικά περιοδικά: Δημοσιεύσεις στα θέματα των βιβλίων από τη βάση δεδομένων - arXiv
