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 61		2nd
COURSE TITLE	Structure of Matter and Universe		
INDEPENDENT TEACHING ACTIVITIES *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*		**WEEKLY TEACHNG HOURS**	**CREDITS**
Weekly teaching hours 18 – 19 * 30 weeks		560	20 ECTS
Add rows if necessary. The organization of teaching and the teaching methods used are described in detail under section 4			
COURSE TYPE Compulsory, Optional, Optional mandatory	ELECTIVE		
PREREQUISITE COURSES:	The choice of PSF 61 requires the simultaneous attendance or completion of the units of 1st year		
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/en/advanced-studies-in-physics/topics/		

(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*

- Possess advanced knowledge in Solid-State Physics, Particle Physics, and Quantum Field Theories, and in particular Degree Theories and Astrophysical Cosmology.
- Understand and distinguish the common foundation of all these different fields of physics that describe the microcosm and the macrocosm by combining this knowledge.
- Learn to focus on the syllabus with critical thinking and categorize each piece of knowledge they are taught, given that they are required to cover a very large and diverse material.
- Gradually understand the discovery of the common foundation of the different fields of physics through the analysis and synthesis of different knowledge.
- Reorganize what they learned at the undergraduate level as a science student, laying a solid foundation for their scientific thinking, through the organization and synthesis of the different knowledge.
- Having changed their way of thinking, along with the new knowledge they will have acquired together with their comprehensive understanding of it, students will be able to draw conclusions about the world around them and transfer the skills they have acquired and their judgement to other situations in their lives.

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?

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

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
Development of free, creative and inductive thinking
Critical thinking

(3) COURSE CONTENT

The unit PSF 61 has elementary particles, nuclei, solids and astrophysics as key subjects. Its main objective is for the student to deepen his/her knowledge and connect the structure of matter from its most elementary form to the cosmological moment when gravity prevails and small and large star systems are being formed

(stars, planets, galaxies, etc.). The theoretical background and mathematical tools of these sciences (eg. elementary particle physics, theoretical cosmology, astrophysics, observational cosmology) are used in an attempt to describe physically and mathematically the evolutionary path from Big Bang to large-scale structures, the connection between the micro and macro – scales of the cosmos.

(4) TEACHING METHODS--ASSESSMENT

<table>
<tr><td>MODES OF DELIVERY
Face-to-face, in-class lecturing, distance teaching and distance learning etc.</td><td>Distance education with five Group Counseling Meetings (OSS) during the academic year and on weekends.</td></tr>
<tr><td>USE OF INFORMATION AND COMMUNICATION TECHNOLOGY
Use of ICT in teaching, Laboratory Education, Communication with students</td><td>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.</td></tr>
<tr><td>COURSE DESIGN
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.

The study hours for each learning activity as well as the hours of selfdirected study are given following the principles of the ECTS.</td><td>
<table>
<tr><th>Activity/Method</th><th>Annual workload</th></tr>
<tr><td>6 OSS (* 4 hours)</td><td>24</td></tr>
<tr><td>Preparation of Assignments (6 assignments * 10 hours)</td><td>60</td></tr>
<tr><td>Examination</td><td>3</td></tr>
<tr><td>Individual study</td><td>473</td></tr>
<tr><td>Total unit workload (hours)</td><td>560</td></tr>
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</td></tr>
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STUDENT PERFORMANCE EVALUATION/ASSESSMENT METHODS *Detailed description of the evaluation procedures:* *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.* *Specifically defined evaluation criteria are stated, as well as if and where they are accessible by the students.*	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

- Yorikiyo Nagashima (2010), *Elementary Particle Physics: Quantum Field Theory and Particles*, volume I, Wiley- VCH publishers
- Martin Harwit (2006), *Astrophysical Concepts*, Springer
- George B. Rybicki, Alan P. Lightman (1985), *Radiative Processes in Astro-physics,* Wiley-VCH publishers

Additional digital (and multimedia) material is available within the “study” platform

- Related scientific Journals:

Annual Review Astronomy & Astrophysics