COURSE OUTLINE

(1) GENERAL

SCHOOL	SCHOOL OF SCIENCES		
ACADEMIC UNIT	DEPARTMENT OF PHYSICS		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	**204**	**SEMESTER**	**6,8**
COURSE TITLE	NUCLEAR PHYSICS AND TECHNOLOGY		

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	4
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
PREREQUISITE COURSES:	-
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes (Greek & English)
COURSE WEBSITE (URL)	https://ecourse.uoi.gr/course/view.php?id=3680

(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*

This course provides students with the opportunity to understand specific topics in the field of Nuclear Physics by delving into nuclear reactions, neutron physics, nuclear astrophysics, and issues related to nuclear technology and the applications of Nuclear Physics. After successfully completing the course, the student will be able to:

- Interpret experimental results in terms of different reaction types and mechanisms such as elastic scattering, heavy ion fusion, and compound nucleus decay.
- Understand and apply basic concepts of neutron physics (interaction of neutrons with matter, neutron detection, etc.).
- Comprehend basic concepts of nuclear astrophysics and nucleosynthesis mechanisms.
- Describe and apply the corresponding principles and mechanisms governing the interaction of ionizing radiation with matter.
- Understand and describe the detection methods for particles as well as ionizing radiation.
- Outline methods and interpret experimental data from nuclear elemental analysis techniques.
- Understand and acknowledge the application of the radioactive decay law as one of the

most powerful tools to reveal the Earth, Solar system and Universe geological history through the various dating methods (radiochronometry).
- Explain the basic mechanisms of radionuclide transport in the environment and understand the potential health risks from the interaction of nuclear radiation with living organisms and humans and to know the appropriate protective measures.

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 or with a team, Working in an interdisciplinary environment, Production of free, creative and inductive thinking

(3) SYLLABUS

Nuclear reactions, mechanisms of nuclear reactions, direct reactions, compound nucleus reactions, nuclear reaction resonances, optical potential, neutron physics, nuclear astrophysics, basic mechanisms of nucleosynthesis, radiation-matter interaction, detection and measurement of nuclear radiation, nuclear energy, nuclear methods for elemental analysis, radiochronometry and dating methods based on the radioactive decay law, radionuclide transport in the environment, radiation protection.

(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*	The course website is used to provide information, distribute notes and exercises, post announcements, and communicate 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-*	Written examinations at the end of the course, which assess theoretical knowledge and problem-solving ability.

Activity	***Semester workload***
Lectures	23
Tutorials	29
Study of bibliography	19
Self-directed study	26
Exams	3
Course total	***100***

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.*	

(5) ATTACHED BIBLIOGRAPHY

- KRANE S. ΚΕΝΝΕΤΗ, ΕΙΣΑΓΩΓΗ ΣΤΗΝ ΠΥΡΗΝΙΚΗ ΦΥΣΙΚΗ, ISBN13: 9789600122473, GUTENBERG
- Glenn E Knoll, Radiation Detection and Measurement, John Wiley & Sons, Inc.
- Πολυζάκης Απόστολος, Πυρηνική Ενέργεια και Τεχνολογικές Εφαρμογές (2η έκδοση), ISBN: 978-618-849-653-8
- Σημειώσεις των Διδασκόντων