COURSE OUTLINE

(1) GENERAL

SCHOOL	School of Sciences		
ACADEMIC UNIT	Department of Physics		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	**217**	**SEMESTER**	**6,8**
COURSE TITLE	Applications in Nuclear 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	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*	Specialized general knowledge
PREREQUISITE COURSES:	Non
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes
COURSE WEBSITE (URL)	http://ecourse.uoi.gr/enrol/index.php?id=557

(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 the student with advanced knowledge which concerns applications of Nuclear Physics. More specifically, the aim of the course is to develop an understanding of the way in which basic principles and methods of Nuclear Physics can be used, so that needs and activities of the society are covered. After successful completion of the course, the student will be able to:

- **Recognize and relate the basic principles of Nuclear Physics with the corresponding technological applications.**
- **Describe the properties of the nucleus and the laws which govern the nuclear phenomena which are used in a variety of applications in technology, energy, health, environment and radio-ecology.**
- **Describe the principles of operation of detection systems of ionizing radiation.**
- **Realize the interaction of any kind of radiation with matter.**
- **Suggest the proper nuclear method for solving of a technological problem, according to the material covered in this course.**
- **Describe the basic nuclear analytical techniques such as AMS, PIXE, RBS, NRA, XRF, neutron scattering etc.**
- **Describe the basic techniques of radio-dating.**
- **Describe the basic principles of dosimetry and radioprotection.**
- **Realize the role of Radon in Health Physics and its applications in Geology.**

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	*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	*……*
Production of new research ideas	*Others…*
	…….

Search for, analysis and synthesis of data and information, with the use of the necessary technology, Working independently, Respect for the natural environment.

(3) SYLLABUS

Introductory concepts of Nuclear Physics, Interaction of radiation with matter, detectors of nuclear radiation, Nuclear energy, Physics and technology of nuclear reactors, Physics and applications of neutrons, Methods of analysis of trace elements, Applications of radioisotopes in research and industry, Methods of radio-dating, Radioecology, Dosimetry, Shielding of radiation, Applications of Geophysics, Applications of radioisotopes in medicine, Gamma photography, positron-electron tomography, Nuclear Magnetic Resonance.

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY
Face-to-face, Distance learning, etc.

Face-to-face teaching, Visits to research laboratories of the University of Ioannina.

USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY
Use of ICT in teaching, laboratory education, communication with students

Use of ICT in teaching and 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

Activity	***Semester workload***
Lectures	52
Study and analysis of bibliography	19
Project, essay writing	26
Exams	3
Course total	***100***

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

Written exams at the end of the semester for the evaluation of conclusive understanding and problem solving capabilities.

(5) ATTACHED BIBLIOGRAPHY

- Εφαρμογές Πυρηνικής Φυσικής, Κ.Γ. Ιωαννίδης
- Ραδιοχημεία και Πυρηνικές Μέθοδοι αναλύσεως, W.D. Ehmann
- Introductory Nuclear Physics, K.J Krane
- Nuclear Physics Principles and Applications, J. Lilley
- Biological Effects of Radiation, J.E. Coggle