COURSE OUTLINE

(1) GENERAL

SCHOOL	Science		
ACADEMIC UNIT	Department of Physics		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	**203**	**SEMESTER**	**7**
COURSE TITLE	Nuclear Physics I		

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	5
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:	non
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes
COURSE WEBSITE (URL)	http://ecourse.uoi.gr/course/view.php?id=319

(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 to the student the means to conceive Nuclear Physics and more specifically of nuclear structure, nuclear decays and production of nuclear energy. On successful completion, the student will be able to:

- **Describe the basic properties of the nucleus such as nuclear mass, isotopic spin, electromagnetic moments and characteristics of the energy levels.**
- **Handle nuclear stability and nuclear decays, and apply laws which govern them.**
- **Describe α-decay with relation to the potential barrier, be able to solve the problem and calculate the transmission coefficient and the decay constant.**
- **Understand the β-decay energy spectrum and handle issues as classification of decays and calculation of the corresponding transition factor.**
- **Describe the properties of γ-rays and study the decay of nuclear states**

with γ-rays.

- **Describe the shell model and apply it in simple problems of nuclear structure.**
- **Deal with issues of environmental radioactivity from natural or artificial sources**
- **Describe the phenomenology of nuclear reactions and the production of energy from fission or fusion.**

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,
- Team work,
- Working in an interdisciplinary environment
- Production of free, creative and inductive thinking

(3) SYLLABUS

Properties of nuclei (electric charge distribution, mass – binding energy, angular momentum, parity, isotopic spin, electromagnetic moments). Nuclear stability. Alpha, beta and gamma decay. Nuclear potential. Shell model. Production of nuclear energy.

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

Activity	***Semester workload***
Lectures	39
tutorials	13
Study of bibliography	50
Non-directed study	20
exams	3
Course total	***125***

(5) ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

- notes from the instructor (available in the website of the course).

Π.Α. Ασημακόπουλου: Εισαγωγή στην Πυρηνική Φυσική, Εκδόσεις Πανεπιστημίου Ιωαννίνων.

W.N. Cottingham, D.A. Greenwood: Εισαγωγή στην Πυρηνική Φυσική, εκδ. τυπωθήτω-Γιώργος Δαρδανός.

R.R. Roy, B.P. Nigam: Nuclear Physics, Theory and Experiment, John Willey and Sons.