COURSE OUTLINE

(1) GENERAL

SCHOOL	School of Science		
ACADEMIC UNIT	Physics		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	**10YK403**	**SEMESTER**	**7**
COURSE TITLE	**ADVANCED NUCLEAR and PARTICLE PHYSICS LABORATORY**		

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**
Laboratory practice	4	6

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	Specialized knowledge
PREREQUISITE COURSES:	No
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes, in the English language for Erasmus students
COURSE WEBSITE (URL)	https://eclass.uoa.gr/courses/PHYS351/

(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 advanced laboratory course includes specialized experiments of Nuclear and Particle Physics, which highlight the basic instrumentation and methodology required by modern experimental techniques in this field.

With the successful attendance and completion of the course, the student is in position to:

- Understand the required instrumentation, its operation and the methodology used to correctly perform an experiment.
- Recognize the significance of the measured quantities for the confirmation of a physical principle.

- Successfully handle the required instruments of the experimental device.
- Process the experimental data correctly.
- Express the typical statistical and systematic uncertainties of the measurement.

- Organize systematically the data obtained from the experiment.
- Graphically plot the measured data and the derived results.
- Critically evaluate and confirm the physical principle of the experiment.

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…
…….

The course aims at the following general competences

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
Project planning and management
Production of free, creative and inductive thinking
Analytical and synthetic thinking
Critical thinking
Planning
New Technology skills
Creativity
Flexibility / Adaptability
Problem solving

(3) SYLLABUS

- Measurement of hadronic and muonic of the Cosmic Radiation
- γ-γ Angular Correlation
- Study of Compton Scattering
- Study of the Environmental Radioactivity
- Real Event Analysis and selection optimization from data recorded at LHC
- Laboratory project and presentation

(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*	Yes Electronic communication with the students using ICT (Information and Communications Technology) Computer-aided lectures, use of video Projectors, eclass platform, instructors websites
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
Individual Study/ Study and Analysis of bibliography / Preparation	98
Laboratory practice and oral presentations	52
Course Total	**150**

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.*	Oral examination Laboratory work Written work Public presentation

(5) ATTACHED BIBLIOGRAPHY

- Suggested bibliography

- Advanced Nuclear Laboratory Guide, Collective Work, Edited by E. Stiliaris, Department of Physics, National and Kapodistrian University of Athens (2022)

- Related academic journals:

- American Journal of Physics
- Nuclear Instruments and Methods (A and B)
- Physics Education
- The Physics Teacher