COURSE OUTLINE

1. GENERAL

SCHOOL	OF SCIENCES		
DEPARTMENT	OF PHYSICS		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	Y704	**SEMESTER**	7ο
COURSE TITLE	LABORATORY OF ATOMIC AND NUCLEAR PHYSICS		

TEACHING ACTIVITIES *If the ECTS Credits are distributed in distinct parts of the course e.g. lectures, labs etc. If the ECTS Credits are awarded to the whole course, then please indicate the teaching hours per week and the corresponding ECTS Credits.*	**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
LECTURES	4	5
Please, add lines if necessary. Teaching methods and organization of the course are described in section 4.		

COURSE TYPE *Background, General Knowledge, Scientific Area, Skill Development*	Scientific Area
PREREQUISITES:	-
TEACHING & EXAMINATION LANGUAGE:	GREEK
COURSE OFFERED TO ERASMUS STUDENTS:	NO
COURSE URL:	https://eclass.emt.duth.gr/courses/PHYSICS222/

2. LEARNING OUTCOMES

Learning Outcomes

Please describe the learning outcomes of the course: Knowledge, skills and abilities acquired after the successful completion of the course.

Upon successful completion of the course, students will have been introduced to the laboratory and experimental methodology for studying and acquiring data related to the fundamental concepts governing physical phenomena associated with light, electrons, and atoms. They will have observed and studied simple quantum phenomena, and will have understood concepts such as counting rate, detector dead time, geometry factor, detector efficiency, interaction cross section, activation, mean free path, and material thickness. Finally, they will have become familiar with the notions of measurement accuracy and experimental errors and will be able to incorporate them into the analysis of their experimental data.

In addition, they will have acquired the ability to quantitatively interpret physical quantities through real measurements, the critical capacity to compare theoretical predictions with experimental results, and the competence to prepare concise scientific reports with clear presentation of methodology, results, and error analysis.

General Skills

Name the desirable general skills upon successful completion of the module

Search, analysis and synthesis of data and information,
ICT Use
Adaptation to new situations
Decision making
Autonomous work
Teamwork
Project design and management
Equity and Inclusion
Respect for the natural environment
Sustainability
Demonstration of social, professional and moral responsibility and sensitivity to gender issues
Critical thinking

Working in an international environment *Promoting free, creative and inductive reasoning* *Working in an interdisciplinary environment* *Production of new research ideas*
• Application of knowledge in practice • Search, analysis, and synthesis of data and information • Adaptation to new situations • Individual report writing

3. COURSE CONTENT

Error estimation in individual measurements, error propagation, least squares with errors, inverse square law calculations, radioactive decay law, β-radiation, beta emitter bremsstrahlung, gamma-ray spectroscopy, inelastic electron scattering (Franck–Hertz experiment), photoelectric effect (measurement of Planck's constant), wave nature of electrons (electron diffraction), determination of the mass and e/m ratio of the electron, interaction of light with matter, scintillators, and the use of specialized software for simulations of the above experiments.

4. LEARNING & TEACHING METHODS - EVALUATION

TEACHING METHOD *Face to face, Distance learning, etc.*	Face to Face
USE OF INFORMATION & COMMUNICATIONS TECHNOLOGY (ICT) *Use of ICT in Teaching, in Laboratory Education, in Communication with students*	Use of ICT in Teaching Use of ICT in Communication with students
TEACHING ORGANIZATION *The ways and methods of teaching are described in detail.* *Lectures, Seminars, Laboratory Exercise, Field Exercise, Bibliographic research & analysis, Tutoring, Internship (Placement), Clinical Exercise, Art Workshop, Interactive learning, Study visits, Study / creation, project, creation, project. Etc.* *The supervised and unsupervised workload per activity is indicated here, so that total workload per semester complies to ECTS standards.*	

Activity	*Workload/semester*
Laboratory experiment	70
Writing lab report	45
Self Study	10
Course total (25 hours / ECTS)	**125**

STUDENT EVALUATION *Description of the evaluation process* *Assessment Language, Assessment Methods, Formative or Concluding, Multiple Choice Test, Short Answer Questions, Essay Development Questions, Problem Solving, Written Assignment, Essay / Report, Oral Exam, Presentation in audience, Laboratory Report,Clinical examination of a patient,Artistic interpretation, Other/Others* *Please indicate all relevant information about the course*	Compulsory in-class assignments (30%). Proper execution of the experiment (10%). Final written examination (60%) (use of notes is not permitted).

assessment and how students are informed	

5. SUGGESTED BIBLIOGRAPHY

- Suggested bibliography:
- Related academic journals:

- *Laboratory Exercises in Atomic Physics*, S. Dedoussis et al., Thessaloniki, 1998
- *Nuclear Physics in the Laboratory – Student Exercises*, Ch. Eleftheriadis et al., COPYCITY, Thessaloniki, 2012