Course Title	**JUNIOR PHYSICS LABORATORY II**				
Course Code	**PHY 322**				
Course Type	Specialization course – Available to Erasmus and YUFE students				
Level	Advanced				
Year / Semester	3rd or 4th year / 5th or 7th semester				
Teacher's Name	Panos Razis				
ECTS	6	Lectures / week	3-4 hours (first week)	Laboratories / week	4-6 hours
Course Purpose and Objectives	The practice of graduating students in a modern laboratory environment is a necessary ingredient and an essential asset of a degree in physics, regardless of the direction and professional orientation that will follow later. In particular, modern labor market requires students to gain experience in modern technologies, computing, electronic data acquisition systems, detector devices, microelectronic circuits, calibration techniques etc. The subject matter of the course includes a series of fundamental experiments in Atomic and Nuclear Physics, with focus on the autonomy of each experiment and its contribution to the development of physics. Particular attention is provided to the utilization of computers for both the acquisition and analysis of experimental data.				
Learning Outcomes	The students acquire systematic experience and skills in performing the following actions: • Calibrate and use efficiently important electronic devices, such as oscilloscopes, multimeters, teslameters, high voltage power supplies, pre-amplifiers, main amplifiers, ADCs, multichannel analyzers. • Master the principle of operation of various types of nuclear radiation detectors and to calibrate them and use them to acquire data. • Process the acquired data and to calculate the relevant physical quantities of the experiments conducted in the course. • Use the Maestro software for data acquisition and calibration of energy spectra. • Use the Origin software for fitting theoretical functions to the experimental data and to present the graphic representation of the results. • Develop suitable skills (for example power point) for presenting the corresponding results to an audience.				
Prerequisites	Officially none	Required	Officially none		
Course Content	**Introduction:** 1.1 Gauss and Poisson Distributions				

	1.2 Least Squares Method 1.3 Interaction of Charged Particles with Matter 1.4 Basic Nuclear Electronics **Experiments:** 2.1 Measurement of the Specific Charge of the Electron 2.2 Observation of the Zeeman Effect 2.3 Electron Spin Resonance 2.4 The Compton Effect 2.5 X-Ray Fluorescence and Moseley´s Law 2.6 Rutherford Scattering 2.7 Spectroscopy of α–Particles 2.8 Spectroscopy of β–Particles 2.9 Spectroscopy of γ–Rays 2.10 The Geiger-Müller Counter
Teaching Methodology	Introduction and examination of the students in the theoretical part of each experiment prior to its performance. Carrying out the experiments under the supervision of the faculty member in charge and of the technical staff of the laboratory. Delivery before leaving the laboratory of all the measurements they took.
Bibliography	**1.** H. Tsertos, "Experimental Physics II", comprehensive students manuscript, University of Cyprus, Nicosia 2016 (main text, in Greek). **2.** G. F. Knoll, “Radiation Detection and Measurement”, John Wiley & Sons, Inc., New York. **3.** P. R. Bevington, "Data Reduction and Error Analysis for Physical Sciences", McGraw-Hill Book Company, New York. **4.** W. R. Leo, "Techniques for Nuclear and Particle Physics Experiments", Springer-Verlag, Berlin , Heidelberg. **5.** N. Tsoulfanidis, "Measurement and Detection of Radiation", McGraw-Hill, New York. **6.** A. Melissinos, "Experiments in Modern Physics", Academic Press. **7.** K. S. Krane, "Introductory Nuclear Physics", John Wiley & Sons, New York.
Assessment	• Reports of all experiments (30%) • Oral Exam/Presentation of an experiment (20%), • Final Exam (50%)
Language	Greek/English depending on the audience.