

Course Details

Course Department:	Department of Physics
Course Code:	PHY 114
Course Title:	Physics Laboratory I
Number of ECTS:	7
Level of Course:	1st Cycle (Bachelor's Degree)
Year of Study (if applicable):	1
Semester/Trimester when the Course Unit is Delivered:	Spring Semester
Name of Lecturer(s):	Grigorios Itskos
Lectures/Week:	--
Laboratories/week:	1 (4 hours per lecture)
Tutorials/Week:	--
Course Purpose and Objectives:	<ul style="list-style-type: none"> To introduce students to data and error analysis and allow them to apply them to the analysis of Newtonian Mechanics experiments To develop the experimental skills of the students
Learning Outcomes:	<p>It is expected that the students of the course will be able to:</p> <ul style="list-style-type: none"> To comprehend the basic principles of data and error analysis and apply them in the analysis of experimental exercises To develop techniques appropriate for the mathematic analysis of experimental data such as the least squares method To become familiar with the proper creation and analysis of graphical charts including graphs in logarithmic and semi-logarithmic papers, histograms etc. To deepen their understanding of Newtonian Mechanics by performing experiments To thoroughly comprehend physical quantities such as the torque and the angular velocity via experimental exercises in the rotation of rigid bodies
Prerequisites:	Not Applicable
Co-requisites:	Not Applicable
Course Content:	<p>Introduction to Data and Error Analysis (2 Weeks): Experimental measurement, significant figures, experimental uncertainties and propagation of uncertainties, normal distribution, the least square method, graphical plots, (semi)-logarithmic paper, histogram.</p> <p>Experimental Exercises (10 Weeks):</p> <ul style="list-style-type: none"> Simple pendulum Collisions in one and two dimensions Free fall Projectile motion Linear motion with constant acceleration Conservation of energy Circular motion

	<ul style="list-style-type: none"> • Moment of inertia of various rigid bodies • The gyroscope • Aerodynamics of rigid bodies <p>Week of practice and make-up experiments.</p>
Teaching Methodology:	<p>Four 2-hour lectures (2 first week) containing an introduction to data/error analysis. The students are organized into groups of 2 to 3 and the schedule of the experimental exercises is announced.</p> <p>Ten 4-hour experimental sessions that contain:</p> <ul style="list-style-type: none"> • Short quizzes (15-20 min) to assess the students preparation on the theory/methodology of the experiment to be performed • The students perform the experiments under the supervision of the instructor and discuss with him aspects of the methodology and theory of the experiment. <p>Submission of lab report (one per group) one week after the performance of the experiment. The evaluated reports are returned to the students one week after delivery to the instructor and the main weaknesses of the reports are discussed with each group separately.</p>
Bibliography:	<p>Main textbook: Lab notes that are supplied by the instructor containing: Theory background, description of the experimental apparatus, experimental methodology and requested data analysis, questions relevant to the experiment.</p> <p>Additional Bibliography:</p> <ul style="list-style-type: none"> • H.D. Young and R.A. Freedman, University Physics: Mechanics, Παπαζήση (Greek Translation) • Haliday-Resnick-Walker, Physics: Mechanics-Waves-Thermodynamics, Gutenberg, (Greek Translation) • Χ. Παπαγεωργόπουλος, "Introduction to Physics Experiments", University of Ioannina • Σ. Σακκόπουλος, "Analysis of Experimental Data – Error Analysis", University of Patra • John R. Taylor, "An Introduction to Error Analysis", University Science Books.
Assessment:	<ol style="list-style-type: none"> 1. Assessment of lab reports: Average grade out of all reports, apart from the first report submitted, that is being used as an assessment prototype for the students, 20% of the final grade. 2. Short Quizzes, 25% of the final grade. 3. Final exam, 55% of the final grade: Completion of one of the experimental exercises taught and execution of a short new/unknown experiment. Delivery of a lab report that contain the experimental analysis and answers to questions relevant to the experiments.
Language of Instruction:	Greek

Delivery Mode:	Face-To-Face
Work Placement(s):	Not Applicable