

PHYS 101L: General Physics I Laboratory, Spring 2023

KOÇ UNIVERSITY

College of Sciences

COURSE INFORMATION

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| Instructor | Nazmi Yılmaz (Sci 136), Ext: 1726, nayilmaz@ku.edu.tr |
| Laboratory Assistants | TBA |
| First Laboratory | March 14, 2023 |
| Office Hours | Laboratory Instructor (Coordinator): Mondays 14:00-15:00; and by appointment in SCI 136. Teaching Assistants: TBA |
| Required Materials | * <i>Experiment Handouts and Lab report question sheets</i> will be shared on the Blackboard platform. Access to Masteringphysics through The Blackboard platform needed for the experiment simulations. * <i>General Physics I Labbook (Hardcopy will available in Copycenter by April), Graph Paper Notebook, Non-programmable calculator, Ruler, Protractor</i> |
| Prerequisites | N/A |
| Grading | Exp1: 15%, Exp2-6: 5x17%, Project Bonus: 10% |

| | | Spring 2023 Tentative Laboratory Schedule General Physics I Laboratory/PHYS 101 Lab | |
|------------------------|---------------|--|--|
| | | Laboratory Sections: 1,3,5,7,9,11,13,15,17,19,21,23,25,27 | Laboratory Sections: 2,4,6,8,10,12,14,16,18,20,22,24,26,28,29 |
| Week1 | Feb.27 | No Lab | |
| Week2 | Mar.06 | No Lab | |
| Week3 | Mar.13 | Exp1: Accelerated Motion on an Inclined Plane | |
| Week4 | Mar.20 | No Lab | |
| Week5 | Mar.27 | Exp2: Projectile Motion | |
| Week6 | Apr.03 | No Lab | |
| Week7 | Apr.10 | Exp3: Dynamics of Motion | |
| Week8 | Apr.17 | Spring Break | |
| Week9 | Apr.24 | Exp4: Conservation of Linear Momentum | |
| Week10 | May.01 | No Lab | |
| Week11 | May.08 | Exp5: Rotational Motion | |
| Week12 | May.15 | No Lab | |
| Week13 | May.22 | Exp6: Physical Pendulum | |
| Week14 | May.29 | Make up Labs | |
| Due Date: Jun15 | | Project Bonus: Selected Topics | |

Phys101 Laboratory Course Outline

Experiment1: Horizontal motion and Motion on an Inclined Plane

The purpose of this experiment is to study the motions with constant velocity and with constant acceleration. The relationships between an object's position, velocity, and acceleration, when the object is moving on a horizontal plane will be investigated when there is a no force acting on the object. And, the relationships between an object's position, velocity, and acceleration, when the object is moving in an inclined plane will be investigated when there is a constant force due to gravity acting on the object.

Experiment2: Projectile Motion

This experiment studies the motion in two dimensions. The ball fired from the Projectile Launcher is a projectile, an object with a certain initial velocity that moves under the effect of gravitational force. If air resistance is neglected, the motion of a projectile is influenced only by the constant gravitational acceleration, which is directed towards the planet Earth and does not depend on the velocity.

Experiment3: Dynamics of Motion

The purpose of this experiment is to verify Newton's 2nd law by measuring the acceleration of a cart while subject to varying net applied forces in a horizontal plane and in an inclined plane. You will do this by measuring the acceleration of the cart, calculating the mass using the Newton's 2nd law, and then comparing the mass obtained with that measured directly from a scale. You will also find static and kinetic coefficient of frictions between the cart and the track.

Experiment4: Conservation of Linear Momentum

In this experiment, the momentum and kinetic energy of two carts before and after an elastic or inelastic collision are investigated. The linear momentum of an object is the product of its mass and velocity. Newton's second law tells us that when the vector sum of the external forces acting on a system of objects is equal to zero, the total linear momentum of the system remains constant.

Experiment5: Rotational Motion

In this experiment, using the relation between the torque and the rotational acceleration, we will determine the moment of inertia of a disk around its symmetry axis using the measured acceleration of a mass hanged by a rope on the rim of the disk.

Experiment6: Physical Pendulum

The purpose of this experiment is to measure the acceleration due to gravity using a physical pendulum, and determine the moment of inertia of a physical pendulum from the period of oscillation.

Phys101 Laboratory Course Learning Objectives

At the end of this course, students will be able to:

Apply the physics concepts taught in General Physics I course in related experimental settings.

Collect experimental data and share experimentation responsibility (rotate rules, give constructive feedback) with other group members.

Determine how to measure data and how to reduce sources of error in experiments.

Make predictions about outcome of measurements and experimental results.

Calculate percent error and standard error to evaluate the experimental results.

Plot and analyze graphs on scientific graph paper and apply linear regression method to find the line of best fit.

Justify varying experimental results by giving plausible explanations.

Prepare a lab report to describe the experimental process and summarize the experimental results.

LABORATORY RULES

Attendance

Attendance at all laboratory sessions is mandatory. Biweekly Laboratory sessions will be conducted via the zoom link on the [Blackboard](#) platform until face-to-face education commences. Students are eligible for makeup laboratory sessions only by having a medical report approved by Koç University Health Center or an excuse form approved by the Dean of Students covering the missed laboratory date.

Withdrawal from Phys101L

- Withdrawing from the Phys101 course does not mean a consequent withdrawal from the Phys101Lab course. Students need to withdraw from the Phys101lab course separately from the Phys101 course. This only applies to withdrawal, not to add-drop.

Online Experiments

- There will be zoom meetings during Laboratory hours when the Lab Instructor will discuss the theory and procedure of the experiments with the students. The online Experiment Link, the Experiment Manual and the Lab DataSheet and Lab ReportSheet will be shared, and the deadline for submitting the Lab Report will be set.
- Students must perform the online experiment, fill in the lab datasheet during the lab hour, write the report and submit it to Blackboard before the due date.

Laboratory Report

- Students must write the lab reports individually. There will be no group work.
- The lab report must be typewritten on the PC. We request graphs to be plotted by hand on graph paper.
- The lab report must be uploaded to the Backboard.
- The lab report must include the Semester, Course, Date, ID number, laboratory section and the laboratory instructor of the student.
- Plagiarism checks will be used in Lab report evaluations.
- Due date extensions are only given for exceptional cases the lab instructor acknowledges. Points will be deducted from late Lab reports.
- Use the same font size and same format throughout the Lab report.
- Use formal language and passive voice.
- Use clean, structured language so that the answers can be quickly followed.

Physics Laboratory Safety Rules

- Koç University emergency dial 1122.
 - Wear face mask in the laboratory at all times.
 - Maintain a safe distance when working in the laboratory.
 - Sanitize your hands upon entering and leaving the laboratory.
1. Physics Laboratory equipment include metal, plastic, wood, glass hardware, rotating/moving machinery, electrical, electronic devices. If not properly used, the equipment may cause an accident, fire, explosion, resulting in injuries ranging from minor to lethal.
 2. Always wear appropriate clothing during the laboratory session. Hair, clothing parts or jewelry may get caught in the equipment, causing injury.
 3. Eating, drinking or smoking in the laboratory is prohibited.

4. Follow the instructor's announcements at all times.
5. If instructed, wear protective equipment (gloves, goggles) during the experiment. Protective equipment will be supplied in the laboratory.
6. Inspect the equipment carefully before setup against broken, malfunctioning parts. If there is any problem, inform the lab instructor immediately.
7. Any electrical device must be used in the following sequence:
 - a. BEFORE PLUG IN:
 - i. Inspect the outlet cable and its ends against wear and tear.
 - ii. Make sure the device is not connected to anything else.
 - iii. Make sure the main switch of the device is at "OFF" position.
 - b. BEFORE TURN ON: Make sure that output/adjustment knobs of the device are all at off or minimum position.
 - c. Turn on the device and check that it operates properly.
 - d. Turn off and make the necessary connections to the device in the setup.
 - e. Turn on and use the device.
 - f. Set all the output/adjustment knobs of the device to off or minimum position.
 - g. Turn off the device.
 - h. Disconnect from the setup.
 - i. Unplug the device.

Example on Accidental Plagiarism

This example is taken from a document prepared by the City University of New York.

The following text is taken from Elaine Tyler May's *Myths and Realities of the American Family*:

"Because women's wages often continue to reflect the fiction that men earn the family wage, single mothers rarely earn enough to support themselves and their children adequately. And because work is still organized around the assumption that mothers stay home with children, even though few mothers can afford to do so, child-care facilities in the United States remain woefully inadequate."

Below, there is an excerpt from a student's homework, who made use of May's original text:

"As Elaine Tyler May points out, "women's wages often continue to reflect the fiction that men earn the family wage" (588). Thus many single mothers cannot support themselves and their children adequately. Furthermore, since work is based on the assumption that mothers stay home with children, facilities for day care in this country are still "woefully inadequate." (May 589)".

You may think that there is no plagiarism here since the student is citing the original author. However, this is an instance of accidental plagiarism. Although the student cites May and uses quotation marks occasionally, the rest of the sentences, more specifically the following section: "Thus many single mothers cannot support themselves and their children adequately. Furthermore, since work is based on the assumption that mothers stay home with children, facilities for day care in this country are still "woefully inadequate." (May 589)" almost exactly duplicates May's original language. So, in order to avoid plagiarism, the student either had to use quotation marks for the rest of the sentences as well, or he/she had to paraphrase May's ideas by using not only his/her own words, but his/her own original ideas as well. You should keep in mind that accidental plagiarism often occurs when the student does not really understand the original text but still tries to make use of it. Understanding the original text and understanding why you agree or disagree with the ideas proposed in that text is crucial both for avoiding plagiarism and for your intellectual development.

Reference(s):

Avoiding and Detecting Plagiarism: A Guide for Graduate Students and Faculty. The Graduate Center. City University of New York, 2012. Web. <http://www.gc.cuny.edu/CUNY_GC/media/CUNY-Graduate-Center/PDF/Publications/AvoidingPlagiarism.pdf>