PHYSICS 73.1 ELEMENTARY PHYSICS LABORATORY III
Midyear 2017
Teacher and Student's Copy

Class Schedule: _____ Course Credit: 1.0
Instructor: _____ Consultation Hours: _____
Instructor's E-mail: _____

Prerequisite: Physics 72.1 Co-requisite: Physics 73

A. COURSE GOALS

At the end of the term, the student should be able to

1. understand and appreciate the basic concepts of thermodynamics and modern physics and their application to simple systems;
2. reinforce basic experimental skills and the practice of learning as a group; and
3. present scientific findings formally both in oral and written forms.

B. SCHEDULE

MEETING NO.	EXPERIMENT	OBJECTIVES
1	Course Introduction	Class Policies/Class List Finalization/Orientation
2	**Experiment 1:** Temperature Measurement	**1.** Operate different temperature sensors. **2.** Measure the thermal time constant of different temperature sensors. **3.** Determine the minimum waiting time before reading measurements of temperature sensors. **4.** Characterize the response of different thermal sensors with temperature.
3	**Experiment 2:** Heat Capacity Ratio	**1.** Determine the heat capacity ratio of air using Rüchardt's method. **2.** Compare the heat capacity ratio obtained experimentally with the model of air made up of diatomic gas particles. **3.** Show that the surrounding air is made up of mostly diatomic particles.
4	**Experiment 3:** Heat Conduction	**1.** Understand the concept of thermal conductivity. **2.** Determine the thermal conductivity of brass.
5	**Experiment 4:** Gas Laws	**1.** Determine the relationship between thermodynamic state variables (pressure, volume, and temperature) for an ideal gas. **2.** Calculate the number of particles in a gas using the ideal gas equation.
6	**Experiment 5:** Heat Engine	**1.** Identify the thermodynamic processes involved in the Ericsson cycle. **2.** Calculate the net thermodynamic work done in a heat engine cycle. **3.** Establish the connection between the net thermodynamic work done during a cycle and the mechanical work done by a heat engine in lifting a mass.

7	**Experiment 6:** Determination of Planck's Constant	**1.** Determine the turn-on voltage of light-emitting diodes (LEDs) from their IV-curve. **2.** Relate the turn-on voltage of an LED to the bandgap energy. **3.** Experimentally determine Planck's constant using LEDs.
8	**Experiment 7:** Light Spectra/Investigative Project Proposal	**1.** Differentiate between continuous and discrete line spectra of light sources. **2.** Be familiar with the line spectra of elemental light sources. **3.** Observe bright and faint first order-spectral lines for the helium gas discharge tube.
9	**Experiment 8:** Student Spectrometer	**1.** Identify the basic parts of a spectrometer. **2.** Align a student spectrometer.
10	**Experiment 9:** Determination of Grating Constant	**1.** Compute the wavelength of the incident light from the angular readings of a spectrometer. **2.** Determine the grating constant of a diffraction grating.
11-12	Experiments on Investigative Project	
13	Investigative Project Presentation Consultation	
14	**Mini-conference**	
15	Discussion of Experiments 1-9 Deadline for late submission of worksheets	
16	**Practical Exam**	

C. GRADING SYSTEM

Worksheets	50%
Technical Reports	10%
Investigative Project/Presentation	10%
Investigative Project Final Paper	5%
Lab Performance	5%
Practical Exam	15%
Prelab Sheets	5%
Total	**100%**

Grade Equivalent	
$92.00 \leq x < 100.00$	1.00
$88.00 \leq x < 92.00$	1.25
$84.00 \leq x < 88.00$	1.50
$80.00 \leq x < 84.00$	1.75
$76.00 \leq x < 80.00$	2.00
$72.00 \leq x < 76.00$	2.25
$68.00 \leq x < 72.00$	2.50
$64.00 \leq x < 68.00$	2.75
$60.00 \leq x < 64.00$	3.00
$50.00 \leq x < 60.00$	4.00
$0 \leq x < 50.00$	5.00

D. WORKSHEET GUIDELINES

- All worksheets will be done **BY GROUP**.
- Data will be checked at the **END OF EVERY EXPERIMENT**. Students are **not allowed to clear their setup** unless authorized by the Instructor.
- After accomplishing the activity, worksheets should be submitted at the **START** of the following meeting. **Students are not allowed to work on the previous meeting's worksheet during class hours.**
- Worksheets submitted after the start of the following meeting will be marked **LATE**. Late worksheets will be given a **50% DEDUCTION per week late**.
- The following grading scheme will be used: 0% blank submission, 50% partial credit, 100% full credit.

E. TECHNICAL REPORTS

- The following activities require technical report which will be done **BY GROUP:**
    1. Heat Conduction
    2. Determination of Grating Constant

- To make sure that everyone is involved in writing the technical report, an **EXTRA PAGE** that **describes the roles of each member** in the completion of the paper must be included. A groupmate who does not participate in the completion of the paper gets **ZERO**.
- The first page of the technical report must be **signed by all** the members of the group to taken to mean that all signatories swear that their submitted work is free from any form of scientific misconduct (i.e. plagiarism, falsification of data, etc.)
- If the technical report is plagiarized, **all group members will be subject to disciplinary action**.
- A copy of the technical report matrix must be attached on the last page.
- Technical reports are submitted **one week after the experiment**.

F. INVESTIGATIVE PROJECT (IP)

- The topic for the project may be a modification, investigation, or application of any of the nine activities or Physics 73 concepts.
- Students will be given access to lab equipment for the project during a specified period.
- The investigative project will be done **BY GROUP**.
- Each group must submit **at least three formal typewritten project proposals** on or before the deadline. The proposals are subject to the Instructor's approval.
- If the group has already finished the experiments for the investigative project on the first day, they are **still required to attend the second and third day** for consultations with their Instructor and/or assessment of their progress.
- A written final technical report on the project is required and to be submitted on the day of the Practical Exam.

G. INVESTIGATIVE PROJECT PRESENTATION

- A **mini-conference** will be conducted to present everyone's work. Each group shall prepare a 10-minute slide presentation for this mini-conference. An additional mandatory five minutes will be given for questions from the class and a panel of instructors.
- The presentation's grade will be based from the rubric given by the Instructor.
- If a group fails to present during the scheduled mini-conference, everyone in the group automatically gets a **ZERO** score for the presentation (10% of the grade).
- If a member fails to present but with a valid excuse, he/she will be presenting on his own. He should consult his Instructor for the schedule.

H. LAB PERFORMANCE

- The performance of each member in the group will constitute 5% of the grade. The student will assess both himself/herself and his/her peers, and may also be assessed by his/her Instructor.

I. PRACTICAL EXAM

- The practical exam will consist of at least 9 stations, one for each experiment, and will be multiple-choice question type.

J. GENERAL GUIDELINES

- A student is responsible for knowing the proper operation of any apparatus/equipment assigned to him/her or his/her group. Any student who has damaged (repairable/irreparable) any apparatus/equipment shall be liable for the repair or replacement of the equipment. The repair or replacement should be done at the present semester. Failure to do so may be grounds for ineligibility to enroll in the next semester(s).
- A student who arrives **15 minutes** after the official start time of the class will be considered late. A student who arrives beyond **30 minutes** after the official start time of the class will be considered absent and will automatically get a **ZERO** for the activity.
- A student is given a grade of 5.0 if the accumulated absences reach more than 20% of the class meetings.
- **MAKEUP ACTIVITIES** will be given **ONLY** to missed activities with a **VALID EXCUSE.** An excuse is valid if a valid excuse slip/letter is submitted **on or before the first day the student is able to come to class**. A VALID EXCUSE SLIP is in the form of either (1) a medical certificate from the UP Health Service, (2) a death certificate of

immediate family member noted by the student's guardian/parent or (3) official university representation. Other reasons will be subjected to course group discretion. Students only have **ONE DESIGNATED CLASS DAY** to make-up for missed experiments.

- Missed activity (experiment, IP, IP Presentation) due to **UNEXCUSED ABSENCE** is given a **ZERO.**
- In the event a student misses the practical exam, a grade of "INC" is given with the remark "missed the practical exam" PROVIDED that the student has a pre-final grade of 45% or better and that the absence in the exam has a VALID EXCUSE. In this case, the valid excuse slip must be presented to the instructor one day after the exam date.
- The "INC" has to be completed within a year by taking the practical exam in any of the next two semesters. Otherwise, the student would automatically get a grade of **ZERO** for the practical exam.
- In the event a student misses the practical exam without a valid excuse (e.g. not informed of an exam, got up late for the exam), his/her practical exam grade is **ZERO**.
- A grade of "DRP" is given upon the **INITIATION OF THE STUDENT ONLY**. There is no automatic dropping of the subject after the attendance sheet is finalized. The student must inform the instructor **at least 2 days before the deadline** of dropping.
- A student granted an LOA will only be given a grade of either DRP or 5.00. A grade of 5.00 is given if the LOA is granted after the deadline for dropping has lapsed and the student's class standing is failing; otherwise, a grade of DRP is given.
- A grade of "4.00" implies that the student should retake the course. **THERE IS NO REMOVAL EXAM**.
- The last day of returning of all prelab sheets, worksheets and technical reports is on the day of the practical exam. **A student who does not surrender ALL his/her prelab sheets, worksheets and technical reports gets an "INC"**.

K. CHEATING

- **Any form of cheating in examinations or any act of dishonesty in relation to studies, such as plagiarism, shall be subject to disciplinary action.**

L. COURSE REFERENCES

- Young, H and R. Freedman, University Physics, 13th ed., Addison-Wesley, 2012.
- Tipler, P. Physics for Scientists and Engineers, 4th ed., W.H. Freeman and Co./Worth Publishers, Inc., 1999.

M. GROUPMATES

List the names of your groupmates on the table below. Get the best modes of getting in touch with them in case you have concerns regarding the course.

NAME	MOBILE NO.	E-MAIL

N. IMPORTANT DATES

Start of Classes	Jun 13 (Tue)
UP Foundation Day	Jun 18 (Sun)
Mid-semester	Jun 26 (Mon)
Deadline for Dropping	Jul 4 (Tue)
End of Classes	Jul 12 (Wed)
Deadline for Submitting Grades	Jul 25 (Tue)