Introductory Modern Physics Laboratory PHY 3310

Lab Instructor: Abir Kabbani (ez7668@wayne.edu)

Lab Time and Room: T 12:50pm-3:40pm**,** Modern Physics Lab, Physics Building, Room 125

Office and Office Hours: 281 Physics Building; Tuesday 10:00-11:00 AM (and we can always set other times per your availability, we'll talk more in class)

Course Synopsis

This is a lab course which runs concurrently with PHYSICS 3300: Introduction to modern Physics. The course will basically deal with modern physics experiments based on the material that you learn in the lecture.

Learning Outcomes

By the end of the lab course you should be able to do the following:

- Learn basic experimental skills in the lab
- Understand modern physics concepts using simple set ups of major physics experiments
- Data analysis of experimental data, especially linear regression
- Able to write lab reports
- Learn to use Matlab for small computational tasks

Required Text: *No textbook required; related material will be posted on Blackboard*

Labs: There will be a total of 10 labs

Grading Determination: A: 90-100%, A-:85-89%, B+:80-84%, B:75-79%, B:-70-74%, C+:65-69%, C:60-64%, C-:55-59%, D+:50-54%, D:45-49, D-:40-44%, F:0-39%

Laboratory Schedule

Lab Number	Date	Title
1	9-13	Linear Regression
2	9-20	Introduction to MATLAB
3	9-27	Michelson Interferometer
4	10-4	Stefan Boltzmann Law
5	10-11	Photo-Electric Effect
6	10-18	Microwave Diffraction
7	10-25	Electron Diffraction
8	11-1	Frank Hertz
9	11-8	Spectrograph- Balmer Series
10	11-15	Nuclear Decay

General Guidelines

Physics, as a discipline, requires scientific thinking. This is typically done by making observations and relating it to the existing theory behind it. If one comes across some new interesting result, then the theory would have to be revamped or changed. All this requires communicating clearly what you observe and what you understand using theory and your observations.

Material for the labs will be posted on blackboard the week prior to when the actual lab will be done. You should possess a copy of the same when you come to lab. You are expected to have read the lab before you come to the lab. Reading does not mean a quick glance. It means that you know what the physical quantities you will be measuring are and what are the physical quantities which you will be calculating as an end result.

Typically, you will be working in groups of two or three. The goal is to finish the lab for that day, completely, in lab. This means that you will finish data collection, analysis and plots within the allotted time. This requires you to come completely prepared for the lab. When you come to the lab, you will come with a sheet with the following information explicitly typed up

- The main idea of the experiment for that particular lab
- The physical quantities that you are actually going to measure in lab
- The equations that you will be using for data analysis (The various physical quantities in the equations should be explained clearly along with the units)
- Wherever applicable, the theoretical value or the expected value of the physical quantity that you will be measuring in lab along with the appropriate units.

Scientific pursuit requires active collaboration. Therefore discussion with lab partners and members of other groups are encouraged. However, when it comes to data collection or plotting the data every student should be able to do it independently. The lab instructor will not only check the student's preparedness but will also issue a grade based on it.

The following few lines tells you how data should be presented. It should be possible for you to identify and construct data tables corresponding to the various physical quantities that you will be measuring along with the appropriate units. You are expected to do this before coming to the lab. After genuine efforts on your part, if you are still stuck, your lab instructor will help you out with this. When data is plotted using an automated tool or software, you will need to specify what are the quantities on the x and y axes. You would also have to give the appropriate units on the axes. Your graph/plot should contain a title. If possible any specific details about the experiment should be incorporated in the graph/plot. An unknown third person looking at your plot should understand what you are talking about.

At the end of the lab you will turn in the write up that you brought in, data sheets and plots