PHY-392 Laboratory II

Credit Hours: 0-2

Pre-requisite: None

Course Objectives: This course is aimed to provide students with hands-on experience with the physical principles covered in previous courses. This course is primarily concerned with learning the fundamental ideas of wave-particle duality, wave optics, the nature of atomic shells, conduction phenomena, and scattering rate through experiments.

Core Contents: Advanced Level Physics experiments

Detailed Course Contents: wave-particle duality: Diffraction of electrons in a polycrystalline lattice, Photoelectric Effect, Determining the magnetic field as a function of the resonance frequency, Franck-Hertz curve for mercury, Determining the polarity of the charge carriers and Hall constant, Measuring of the Hall voltage as function of the current at a constant magnetic field, Observing the interface pattern, Rutherford scattering, Determining the velocity of light in the air, Normal Zeeman effect.

Course Outcomes: At the end of the course, students will be able to understand:

- the wave-particle duality
- the molecular and crystal structures
- the energy loss of free electrons due to inelastic scattering
- the polarity of the charge carriers
- the density and mobility of charge carriers
- the concept of nuclear scattering
- the splitting of atomic energy levels

Textbook: Lab Manuals

Reference Books:

- N/A

Weekly Breakdown		
Week	Section	Topics
1	Instruction Manual	Introduction to the lab
2	Instruction Manual	Diffraction of electrons in a polycrystalline lattice
3	Instruction Manual	Electron spin resonance: Determining the magnetic field as a function of the resonance frequency-I
4	Instruction Manual	Electron spin resonance: Determining the magnetic field as a function of the resonance frequency-II
5	Instruction Manual	Franck-Hertz experiment with mercury
6	Instruction Manual	Investigating the Hall effect in silver
7	Instruction Manual	Determining the density and mobility of charge carriers in n-germanium-I
8	Instruction Manual	Determining the density and mobility of charge carriers in n-germanium-II
	Instruction Manual	**Midterm Exam**
9	Instruction Manual	Investigating the anomalous Hall effect in tungsten
10	Instruction Manual	Setting up a Michelson interferometer on the laser optics base plate
11	Instruction Manual	Rutherford scattering: measuring the scattering rate as a function of the scattering angle and the atomic number
12	Instruction Manual	Determining the velocity of light in the air from the path and transit time of a short light pulse
13	Instruction Manual	Observing the normal Zeeman effect in transverse and longitudinal configuration-I
14	Instruction Manual	Observing the normal Zeeman effect in transverse and longitudinal configuration-II
15	Instruction Manual	Revision