



## **INTRODUCTION TO PEN 156 ELECTRICITY AND MAGNETISM LABORATORY**

The objective of this laboratory course is to teach electricity and magnetism by observations from experiments. This approach complements the classroom experience of Physics II, where you learn the material from lectures and books designed to teach the theories and improve your skills for problem solving based on the theories.

The electric force is one part of one of the four fundamental forces of nature. One may argue that this force is the mostly frequently encountered force, being responsible for a range of phenomena, including chemical bonding, repulsion between material objects, and currents in circuits. It is a great achievement that all classical electricity and magnetism phenomena can be explained by four equations, the so-called Maxwell's equations. This laboratory course is designed to perform experiments showing the validity of these equations. In the laboratory you can apply the theories to real world problems by comparing your application of those theories with reality.

For example, you would see if the current increases linearly when you apply voltage across the ends of a resistor. You could comment on how to increase the discharging time of a capacitor in an RC circuit. Maybe, you have not encountered any circuit element that does not obey Ohm's law before, you will see here! You will notice and define an alternating current signal that is used in electric generators, motors and power distribution systems. You can easily develop an experimental set-up for uniform magnetic field distribution. If electrical power is needed, you can produce by changing magnetic field!...

It would be very instructive for you to compare your experimental results with the expected results from theories and to determine the percentage if you encounter a small deviation. We hope you find this laboratory manual helpful in your study of this laboratory class.