Lab Experiments for Physics 492 Fall 2024		
Lab number	**Lab name**	**Subjects**
I	**Voltmeters and Scopes**	Introduction to the test equipment and some components (incuding diodes) that you will use in Physics 492 and Physics 493.
II	**Frequency Dependence**	You will study circuits made from linear components: resistors, capacitors and inductors. You will build filters and resonators. You will learn the concept of impedance and its importance in circuit analysis and electrical measurements. You will also learn why we use scope probes and terminators for scope measurements.
III	**More Diodes**	This lab begins the study of semiconductor components. You will find the relation between the voltage and current in an ordinary diode and a zener diode. You will study temperature effects, rectification, and nonlinear circuit equilibirium.
IV	**Constructing a Diode Thermometer**	You will use a diode to design an analog thermometer that will work down to liquid-nitrogen temperatures. You will then build your own thermometer in a plastic housing that uses battery power.
V	**Measuring Specific Heat of Metals**	Use your homemade analog thermometer to measure the specific heat of various metals over a wide temperature range.
VI	**Bipolar Transistors**	The workhourse of electronics: the bipolar transistor. You will build amplifiers, an emitter follower, a constant-current source, and a switch.
VII	**Differential Amplifiers**	The differential amplifier forms the front end of all operation amplifiers. You will build a differential amplifier with a constant current source to eliminate all common mode noise.
VIII	**JFET Transistors (time permitting)**	This lab explores basic JFET transistor characteristics, circuits and applications. You will build a JFET switch, memory cell, current source, and voltage follower, attenuator, modulator, and transmiter.
IX	**Op-amps**	You'll study operational amplifiers and feedback. You will construct a comparator, follower, current source, as well as inverting, non inverting, differential, and summing amplifiers. The lab assumes that the op amps are perfect and uses the Op Amp Golden Rules to analyze the circuits.