

PHYSICS 517/617 Summer 2007

Prof. Fengyuan Yang

Office PRB2006 (688-4390)

Email: fyyang@mps.ohio-state.edu

Office Hour: Wednesday 1:30-2:30 --- feel free to stop by at any time.

LECTURES: Mondays 9:30am - 11:18am, MP1005

LABORATORY: Tuesdays and Wednesdays 9:30-12:18 Rm. SM3005 (Smith Lab}

TEXTBOOK: *Introduction to Electronics for Scientists and Engineers*, Robert E. Simpson

WEBPAGE: <http://www.physics.ohio-state.edu/~fyyang/teach/Phys517/index.html>

Additional references are included in this document and the books are on reserve in the Physics Library.

GOALS:

This course (either 517 or 617) is designed to provide an introduction to electronics for students with a background at the level of a calculus-based introductory physics course in physics. Upon this basis we will rapidly build a basic understanding of passive components, semiconductors (diodes and transistors), and analog and digital integrated circuits. After completing this course a student should be able to make a variety of simple electrical measurements with some degree of proficiency, design and use basic circuits, and read the literature on more advanced circuitry and measuring techniques with a hope of understanding the subject. It is not expected that the student after taking this course will become sufficiently proficient in electronics to become a circuit designer.

PROCEDURES:

There will be no examinations in this course. The grade in this class will be based on laboratory performance, laboratory reports, and homework. Every student must complete all assigned problems and each of the *basic* experiments. Students enrolled in Physics 617 are also expected to complete the advanced experiments. Physics 517 students can, if they wish, work on advanced experiments for extra credit, but only after first completing the *basic* experiment. The schedule for the quarter shows dates when lab reports are due following the completion of each of the seven laboratory assignments.

I suggest that you buy (or reuse) two notebooks, so that you can be using one while I am grading the other. The reports are to include, for each lab, an introduction, with

objectives; raw data (with circuit diagrams, component values, instruments used); a running account of your procedures; data analysis; error analysis (brief); and conclusions. Each lab report is worth 100 points and will be graded on the basis of your preparation for and initiative demonstrated in carrying out the experiment, the quality and neatness of the notebook record, and the extent of the investigation.

The homework assignments will come from the textbook and elsewhere. Some of the problems will be relevant to your preparation for laboratory experiments, so you should make an effort to keep up to date. The homework will be graded on the basis of 10 pts. per problem.

At the end of the quarter, grade assignments will be based on the following weighting scheme:

Homework 20% Laboratory 80%

In addition to the eight hours of formal class time, students should expect to spend a substantial amount of time each week reading, calculating, working problems, and preparing reports. The workload, especially at the beginning, will depend on any previous experience with electronics. Many students will find that they cannot complete the laboratories in six hours per week. Access to the laboratory at other than the scheduled times is possible by your BuckID. Students working outside of class hours are fully responsible for turning off lights and locking both doors when they leave. Free access to the room and your equipment is a privilege which will be revoked if it is abused.

I hope that you find this class a rewarding one.

Syllabus:

Week	Day	Lecture	Lab
1	June 18	Lecture 1: DC Circuit	
	19		Lab 1: Instrumentation and Resistors
	20		Lab 1: Instrumentation and Resistors
2	25	Lecture 2: Capacitors, (L)RC Circuits, AC Circuits	
	26	HW 1 due	Lab 1: Instrumentation and Resistors
	27		Lab 1: Instrumentation and Resistors
3	July 2	Lecture 3: Capacitors, (L)RC Circuits, AC Circuits	
	3		Lab 2: LRC Circuits
	4	Independence Day	
4	9	Lecture 4: Diodes Lab 1 report due	
	10	HW 2 due	Lab 2: LRC Circuits
	11		Lab 3: Diodes and Rectifier Circuits
5	16	Lecture 5: Transistors Lab 2 report due	
	17	HW 3 due	Lab 3: Diodes and Rectifier Circuits
	18		Lab 4a: Transistor Characteristics and Transistor Amplifiers
6	23	Lecture 6: Operational Amplifiers Lab 3 report due	
	24	HW 4 due	Lab 4a: Transistor Characteristics and Transistor Amplifiers
	25		Lab 4 b: AM Radio
7	30	Lecture 7: Digital Circuits, Boolean Algebra	
	31		Lab 4 b: AM Radio
	Aug. 1		Lab 5: Operational Amplifiers
8	6	Lecture 8: Digital Circuits, Memory, μ Processors Lab 4 report due	
	7		Lab 5: Operational Amplifiers
	8		Lab 5: Operational Amplifiers
9	13		Lab 5: Operational Amplifiers
	14		Lab 6a: Digital Circuits
	15		Lab 6a: Digital Circuits
10	20	Lab 5 report due	Lab 6b: Basic Stamp, μ Processor
	21		Lab 6b: Basic Stamp, μ Processor
	22		Lab 6b: Basic Stamp, μ Processor
	23	Lab 6 report due	