

# Physics 318: Theory and Applications of Electronic Measurements

## Fall 2011

Text: *An Introduction to Modern Electronics* by William L. Faissler  
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**Course Objectives:** Become familiar with modern electronic circuits and their applications. Includes circuit analysis, digital electronics, analog devices, transistor circuits, and some computer interfacing. After successfully completing the course, the student should be able to read schematic diagrams, construct, and effectively troubleshoot active and passive element electronic circuits.

**Course Format:** Physics 318's course material is presented as classroom theory supported by laboratory experimentation. It is structured such that most of the course's material is learned hands-on in the laboratory. The lab manual, written specifically for the course, provides guidance and insight to reinforce valuable hands-on electronic skills and knowledge. The three (3) semester hour course meets for four (4) contact hours a week. There are two one-hour sessions, one on Tuesday and the other on Thursday, and one two-hour session on Friday of each week. There are 15-labs to be completed through the 15-week course. Most labs can be concluded within the allowed class time provided that the student comes well prepared and works efficiently. To that, students are heavily encouraged to work in the lab at times other than regular scheduled class times, in order to complete the lab assignments, as necessary. While the course material is not intrinsically difficult, the breadth of the material is substantial.

**Assignments:** Homework and lab assignments may be given each week. Some labs are coupled with a "pre-lab" assignment. The pre-lab will contain questions and problems that test your understanding of key concepts covered in the forth-coming lab. The pre-lab assignments will be due at the beginning of the lab period and **MUST** be completed before you can begin the lab. There will also be a post-lab assignment for each laboratory. The post-lab will include questions related to the analysis of your data, as well as questions that extend your understanding of the lab.

**Use of Computers:** The Advance Physics Lab contains six iMac computers. Each computer contains a number of programs that will be useful in this course. In particular, students are required to use *Excel*, a spreadsheet / graphics program for displaying and analyzing data. The computers also contain other programs for constructing and manipulating graphics, web browsers, and other useful software.

**Course Grades:** The course grade will be computed as follows \*\*:  
70% Homework and Lab Assignments  
15% Mid-term exam  
15% Final Exam (project)  
\*\* After your final grade is calculated, your grade **WILL** be lowered ONE grade for each laboratory not submitted. \*\*

**Grade Scale:**

94 – 100%	A
85 – 93%	B
76 – 84%	C
67 – 75%	D
≤ 66%	F

**Course Outline:** (Times are approximate)

Weeks 1-4	Basic Circuit Analysis / DC & AC Circuits / Resonance
Text	Chapters 1-10
Labs	DC Circuits / AC Filters / RLC Circuit
Weeks 5-8	Transistors and Introduction to Digital Electronics
Text	Chapters 40-44; 19-22 & 24 plus supplemental materials
Labs	Transistors / Logic Gates / Latches
Weeks 9-13	Digital Electronics and Operational Amplifiers
Text	Chapters 23, 25 & 28-32
Labs	Counters / Timers & Pulse Generators / Op Amp Circuits
Weeks 14-16	Diodes and Regulators / Analog to Digital / Digital to Analog
Text	Chapters 38, 35, 36, & 39 plus supplemental materials
Labs	Power Supplies / D-A and A-D Converters