

Physics 318: Theory and Applications of Electronic Measurements

Fall 2013

Text: *An Introduction to Modern Electronics* by William L. Faissler
Lab Manual *Theory and Applications of Electronic Measurements* by James Votsmier
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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 basic 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 16-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.

Lab write-ups should be computer generated, stapled, and fixed inside of a folder or emailed as a .PDF file. You should turn in your write-up by the COB (i.e. 5:00pm) of the day it is due. Each lab write-up will be graded on a 0-20 point scale. Late lab write-ups work on a three-strike system. Your first late write-up will lose 2 points per day it is late. The second late write-up is automatically eligible to be graded for only 10 points maximum. The third late lab write-up and any other late write-ups will automatically be given zeroes.

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 **:
75% Homework and Lab Assignments
10% 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. **
- Grading Scale:**
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|-----------|---|
| 94 – 100% | A |
| 85 – 93% | B |
| 76 – 84% | C |
| 67 – 75% | D |
| ≤ 66% | F |
- Academic Honesty:** Students are in all cases to submit work, which is their own, performed this semester and has been completed in compliance with any restrictions of materials or time, which may have been imposed. All graded assignments in this course are individual, so all work submitted must ultimately be the individual's. Use of unauthorized materials during an exam, reading from another student's exam or submission of identical works are all violations of the *Student Academic Code*. One way students may assure themselves that the work they are submitting is truly their own in cases where some collaboration is allowed or encouraged is that they can each reproduce all of the work in isolation.
- Plagiarism:** The University gives high priority to matters of academic ethics including plagiarism. Quoting from the University statement: "Plagiarism is the act of representing the work of another as one's own and may consist of copying, paraphrasing, or otherwise using written work or oral work of another without proper acknowledgment of the source or presenting oral or written material prepared by another as one's own."
- "Instructors may impose sanctions for academic cheating in accordance with Student Conduct and Student Grievances: Rights and Responsibilities. In the case of plagiarism, the minimum sanction of the first instance of plagiarism is disciplinary probation; for the second instance of plagiarism the minimum sanction is separation from the University for one term; and for a third instance of plagiarism, the minimum sanction is permanent separation from the University."
- Generally, University policy on plagiarism will be followed to the severest degree allowed.
- Cheating:** SIU policies on Academic Dishonesty and Academic Misconduct will be strictly followed. As permitted by the *Student Academic Code* (p. 5) for a first offense, a zero will be given for the assignment or exam. For a second offense or cheating on the final, a failing grade will be given for the class. Where there is doubt about whether cheating has occurred, the instructor will discuss the incident with the student(s) involved and respective witnesses and any further instance of cheating will result in failure of the class. Note that a zero grade as the result of cheating will not be dropped in computing the final grade and that an advisory memo will be forwarded to the Physics Department Chair and the Provost.
- Withdrawals:** The University Withdrawal Policy will be strictly followed.

Special Accommodations:

Students needing special academic accommodations and who have documented disabilities with an ID CARD from Disability Support Services should make an appointment to discuss these accommodations with the instructor by the end of the first week of class. Students with disabilities are encouraged to visit the SIUE Disability Support Services office located in the Student Success Center (SSC1270, x3726).

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