

Syllabus - Electronics and Instrumentation

Course	Physics 181, Electronics and Instrumentation. Spring 2016
Instructor	Jessica Kintner Galileo 106-B, 925-631-4416, jkintner@stmarys-ca.edu office hours TBD
Website	physics.stmarys-ca.edu has course information
Meetings	M 1-5pm, W 2:45-5:45
Texts	<i>Basic Electronics: An Introduction to Electronics for Science Students, 2nd ed</i> , Meyer <i>Electronics and Instrumentation Laboratory Manual</i> , SMC Physics Department <i>Writing Research Papers Across the Curriculum</i> , Hubbuch
Materials	Lab Notebook (National Computation Notebook 43-648 or TOPS Computation Book) USB flash drive

Course description

We will investigate the properties and applications of various components and circuits. Topics include: d.c. circuits; Thèvenin equivalent circuits; a.c. circuits, particularly RC filters and RLC circuits; semiconductor components with an emphasis on diode applications; operational amplifier circuits; and basic digital concepts.

This is a writing in the disciplines (WID) course. Prerequisites: Physics 1-4, Math 39 (concurrent is fine), and English 5.

Course goals

This course is an opportunity to

1. Develop a working knowledge of electronics.
2. Gain more experience with measurement techniques, data analysis, and mathematics commonly used in physics and engineering.
3. Develop skills in communicating scientific and technical ideas. In particular, to:
 - (a) Recognize and compose readable text, as characterized by coherent paragraphs and well-constructed sentences in standard written English.
 - (b) Recognize and formulate effective written and oral communication, with an emphasis on the conventions expected within the physics community. This involves incorporating graphs, diagrams, and mathematical expressions within a narrative, as well as using appropriate diction and tone.
 - (c) Construct clear, organized, supported and well-reasoned responses to scientific questions.
 - (d) Use the process of writing to enhance intellectual discovery and unravel complexities of thought.

- (e) Follow expected ethical research practices in physics, including the honest presentation of data and acknowledgement of the work of others. See www.aps.org/policystatements/02_2.cfm

Evaluation

The final grade will be based on

Exams	20%
Final Exam	15%
Labs (notebook, quizzes, short write-ups)	35%
Formal reports	15%
Lab work	15%

Three exams will be given, two during the course of the semester and one during the final exam week. The exams will cover material from lecture and lab. The final will be cumulative, and I am willing to replace one exam score with the final exam score, if it is better.

While there are no homework problems due in this course, problems (and solutions!) related to the topics will be given periodically.

Every lab experiment will be given a grade. This grade will be based on either the laboratory notebook entry, a written or task-based quiz, or a short write up of part of the lab. Lab notebooks may be used for quizzes.

Two formal laboratory reports will be due. These reports will require a solid draft and peer review, prior to the final version.

Lab work will be graded over the semester. The grade is based on demonstrating correct circuit building and measurement techniques, the ability to carry out the experiment in some ordered and self-directed manner, and the creativity to troubleshoot and to explore beyond given instructions.

If you believe that there has been an error in grading, request a regrade. The original, *unaltered* work must be resubmitted within one week, accompanied by a written explanation of what you believe was misgraded and what I should consider when regrading.

Attendance is required

There will be one hour of lecture per week, it may be a half an hour Monday and a half an hour Wednesday, or it may be all Monday or Wednesday depending on the content and needs of the lab. The remaining time is lab. Except in cases of extreme and unavoidable circumstances, each absence after the first one (you get one free) will drop your final grade by at least 2%. Repeated or severe lateness may count as an absence.

Center for Writing Across the Curriculum (CWAC)

Writers bring their assignment sheets and readings in order to brainstorm ideas, revise drafts, or work on specific aspects of writing, such as grammar, citation, thesis development, organization, critical reading, or research methods. Writers may discuss any genre, including laboratory reports, argument-driven research, or scholarship application letters. Call 925.631.4684 to make appointments or drop in, Dante 202. See www.stmarys-ca.edu/center-for-writing-across-the-curriculum

Academic honor code

Saint Mary's College expects every member of its community to abide by the Academic Honor Code. According to the Code, "Academic dishonesty is a serious violation of College policy because, among other things, it undermines the bonds of trust and honesty between members of the community." Violations of the Code include but are not limited to acts of plagiarism. For more information, please consult the Student Handbook at www.stmarys-ca.edu/your-safety-resources/student-handbook.

Although you work with others, what you submit should be your work and reflect your understanding. There is no acceptable reason for your work to look exactly like someone else's.

Student disability services

Reasonable and appropriate accommodations for individuals with qualifying disabilities are extended through the office of Student Disability Services. Students with disabilities are encouraged to contact the Student Disability Services office at (925) 631-4358 to set up a confidential appointment to discuss accommodation guidelines and available services. Additional information may be found at the following address on the Saint Marys website: <http://www.stmarys-ca.edu/sds>

Tentative schedule

All topics are shown by week—including the exams. They will probably be on Wednesdays, unless there's a compelling reason to have them on Monday. The final exam is on Monday, May 16.

week	topic and notes
02/08	Resistors in series and parallel, Kirchhoff's Laws IV curves of passive elements
02/15	IV curves of active elements, Voltage divider
02/22	Thevenin equivalents
02/29	AC measurements
03/07	RC & RL filters
03/14	RLC bandpass and resonance Exam 1 , Weds 3/16
03/21	Spring Break
03/28	Diode circuits
04/04	OpAmp circuits <i>ThF Midterm Holiday</i>
04/11	more op amps
04/18	Digital basics
04/25	555 timer Exam 2 , Weds 4/27
05/02	Analog versus digital inputs (arduino)
05/09	Sensors and motor control (arduino)
Finals	Final Exam, Monday, May 16, 1-3pm