

PHYSICS 2701 – Spring 2017 Electronics Laboratory

Course Information:

Call #: 4298 Time: 2:00-3:50 T, Th
Meeting room: Clip 043A & Clip 030
Instructor: Prof J. Roche Office: Edwards #206
Phone: 3-1982 email: rochej@ohio.edu
Office Hour: as needed, by request. Send me an email to arrange an appointment.
Class website: <http://inpp.ohiou.edu/~roche/2701>

All information in this syllabus are subject to change. Changes will be announced in class and by email, you are responsible for keeping up to date with the changes.

Goals and learning outcomes of the class.

The objective of this lab is two fold. You will learn the key individual components used in all the consumer “electronic devices” you live with. You will learn how semi-conductors and pn junctions have profoundly modified our civilization.

The primary course objectives and expected student learning outcomes are:

- Constructing knowledge: collect, analyze, and interpret real data from personal observations of the physical world to develop a physical worldview.
- Modeling: develop abstract representations of real systems studied in the laboratory, understand their limitations and uncertainties, and make predictions using models.
- Designing Experiments: develop, engineer, and troubleshoot experiments to test models and hypotheses within specific constraints such as cost, time, safety, and avail- able equipment.
- Developing technical and practical laboratory skills: become proficient using common test equipment in a range of standard laboratory measurements while being cognizant of device limitations.
- Analyzing and visualizing data: analyze and display data using statistical methods and critically interpret the validity and limitations of these data and their uncertainties.
- Communicating Physics: present results and ideas with reasoned arguments supported by experimental evidence and utilizing appropriate and authentic written and verbal forms.

1 Required Text

Electronic with Discrete Components, E.J. Galvez, Wiley. ISBN 978-0-470-88968-8

Also please consult the lab manual on the class web-site.

2 Attendance/ Lab participation

Attendance in this lab class is necessary and essential. You are expected to prepare for each lab period by reading the book and to be present in the lab for the full duration of the lab period (2 hours, twice a week). Active participation is expected and will be graded on a 3-point scale (good-fair-poor) for every single class meeting. A University-excused absence and/or the prior consent of the instructor will allow you to make up for any session you miss. An absence not made up will result in a zero participation grade for this class meeting.

3 Schedule (preliminary)

Table 1 gives the very preliminary schedule for this class. This schedule will change. Changes to the schedule will be announced in class and by email. It is your responsibility to keep up with the changes announced in class.

4 Grading

You are responsible for all material and announcements covered in class. The grade you earn will be determined by how well you demonstrate your grasp of the subject material. Numerical scores will be compiled with the following weighting. Details on each of the components are discussed in the following sections:

Lab participation	15 %
Homework	25 %
e-Lab report	25 %
Lab Practicum	35 %

The final letter grade will be given according to the following guidelines:

A- to A : 90-100%	D- to D+: 60-69%
B- to B+: 80-89%	F : below 60%
C- to C+: 70-79%	

5 Assignments

5.1 E-reports

The keeping of detailed record of your work is essential both as a student and a professional. As part of this laboratory course you are urged to keep a lab notebook. At regular intervals, you will be asked to turn in a short lab report. The topic of the report will be randomly chosen out of all the exercises performed since the last report. So keep good notes on your personal notebook. Appendix A of this syllabus describes the expected organization of your lab notebook.

5.2 Homework

Homeworks will be assigned every other week. These exercises will allow you to deepen your understanding of the topics under study. A list of homework question is listed on table 1.

Late assignment policy:

Assignments are to be turned by 2pm on the date shown on the schedule. You will receive a 5% penalty per 24h lateness (eg -5% for 1 to 24h late, -10% for 25 to 48 h late,

-15% for 49 to 36h late). Assignments late by a week or more will not be graded and receive a zero.

5.3 Practicum exams

There will be three practicum exams. For these exams, you will be working alone. By the end of the practicum, you will turn in a report following the format described above. We will use one of the practicum exams of the book for these assignments with possibly a few additional questions on (1) key concepts studied during the class or/and (2) simple problem sets (comparable to the homework questions).

This practicum is “open notebook”: you are free to bring your own notebook but that’s it (don’t bring the book). For these exercises, you will work alone.

6 Academic honesty

Students are expected to follow standards of academic integrity and honesty. Academic misconduct is a Code A-1 violation of the Ohio University Student Code of Conduct.

“Academic Misconduct - Dishonesty or deception in fulfilling academic requirements. It includes, but is not limited to cheating, plagiarism, un-permitted collaboration, forged attendance (when attendance is required), fabrication (e.g., use of invented information or falsification of research or other findings), using advantages not approved by the instructor (e.g., unauthorized review of a copy of an exam ahead of time), knowingly permitting another student to plagiarize or cheat from one's work, or submitting the same assignment in different courses without consent of the instructor. Note: An instructor may impose a grade penalty for academic misconduct and/or file a judicial referral.” (http://www.ohio.edu/judiciaries/conduct_policy.cfm)

If you are found to be involved in misconduct regarding this course, you will receive a failing grade on the pertinent work and possibly for the entire course and/or a referral to the Director of Judiciaries.

7 Disability accommodation

Any student who feels s/he may need an accommodation based on the impact of a disability should contact me privately to discuss your specific needs and provide written documentation from Student Accessibility Services. If you are not yet registered as a student with a disability, please contact Student Accessibility Services at 740-593-2620 or visit the office in 348 Baker University Center.

8 Feedback

This is the first time I am teaching out of this book. I encourage all of you to give me constructive feedbacks on the pace of the class, the class organization, etc... You could do so by talking to me during or after class, stopping by my office, sending me an email or leaving me an anonymous note in my mailbox (in Edwards or Clippinger).

Table1: Preliminary schedule for the spring session 2017 of PHYS2701. **Changes to the schedule are expected.** They will be announced in class and it is the student responsibility to keep up with them.

Week	Date	Topic	Remark
1	1-10	Introduction	
	1-12	Chap 1: Basic	
2	1-17		
	1-19	Chap 2: Introduction to Digital Electronic	HW1 due
3	1-24		
	1-26	Chap 3: Combination Logic	e-report 1 due
4	1-31		
	2-2	Chap 4: Advanced Combination Logic	
5	2-7		HW2 due
	2-9	Practicum exam	
6	2-14	Chap 5: Sequential Logic	e-report 2 due
	2-16		
7	2-21	Chap 6: AC signals	HW3 due
	2-23		
8	2-28	Chap 7: Filter and frequency domain	
	3-2		
Spring break			
9	3-14	Chap 8: Diodes	e-report 3 due, HW4 due
	3-16		
10	3-21	Practicum exam	
	3-23	Chap 9: Transistors	HW5 due
11	3-28		
	3-30	Chap 10: Op-amp	e-report 4 due
12	4-4		
	4-6	Chap 11: Digital to Analog	HW6 due
13	4-11		
	4-13	TBD	e-report 5 due
14	4-18		
	4-20		HW7 due
15	4-15 12:20pm	Exam week: Practicum exam	

Appendix: How you should report on your experimental work for this class.

Your reports should be organized in the fashion describe in the following¹. Each section (but the header will count for 25% of the final grade on the report. For each section, 2/3 of the points come from the correctness of your exposé while 1/3 come from the editing quality of the exposé.

1. **Header:** Date, name of your partner, title of the lab.
2. **Executive Summary:** This section should contain a full summary of the lab report including the purpose, the procedure and the result of your analysis. This should not go into too much details but entice the reader to read your full report. This section should be about 5 sentences long.
3. **Introduction/purpose:** This should be a 5-10 sentences description of what you will be doing, how it relates to the chapter of the book under study and what you expect to learn from the lab.
4. **Procedure** of how you did this lab. This should be a short description of how you set up the lab. It **MUST** include relevant circuit diagrams. It is also a good place to include the measured values of all the components that you are using. Finally, you should summarize the measurements that you will be making. eg “We measured the frequency response of the circuit by using a measured input signal and scanning over a frequency range from 1 to 1,000,000 Hz. We measured the input voltage, the output voltage and the phase difference between the input and the output using our oscilloscope.” Do not write a novel, but write enough information that you can set up and repeat your measurement using only your lab book. If there are multiple sections to the lab, you need a procedure for each section.
5. **Data and preliminary plots:** This section shows the data that you collected. This should contain the data that you collected during the lab. Be sure this is labeled including units. This section can also contain neat, sketches of the data to help identify where you need to collect additional data points. Your data and preliminary plots show the data that you collected. This should contain the data that you collected during the lab. It is either in hand-written, properly labeled tables, or from a printed out spreadsheet. Be sure this is labeled including units. This section can also contain neat sketches of the data to help identify where you need to collect additional data points. Finally, if there were problems encountered during data collection, mention them here, and describe how they were resolved.
6. Your **analysis and discussion of your data** is a very important part of your lab. This section should include computer-generated plots of your data. If possible, you should also overlay the expected theoretical curves on top of your data and comment on where things agree and disagree. For major disagreements, there should be some additional discussion as to why this occurred. This section should also contain any calculations that you need to carry out, and if there are theoretical expectations, it should contain the mathematical formula that are needed. You do not need to derive the formulas, but the formulas must be present in your report.

¹ This organization and much of the text explaining it is copied from the “Lab manual” of Carnegie Mellon, edited by C.A. Meyer.

