

Introduction to Electronics

Fall Semester 2009
ENGR-350 = 4 credits

Instructor Dr. Greg Mowry (Greg)

Contact Information Office: OSS-106A
Office phone: 651-962-5749
E-mail: gsmowry@stthomas.edu

Class Lecture MWF, 8:15 – 9:20 AM, in OWS-275
Lab Instructor: Steve Albers. Lab room is OSS-LL09

Office Hours MWF from 9:30 AM to NOON or by appointment.

Required text “Principles & Applications of Electrical Engineering”, 5th Ed. by Rizzoni, McGraw-Hill

Suggested Books “Electric Machinery, 2e” by Peter F. Ryff. Prentice Hall ISBN 0-13-475625-8
“Fundamentals of Engineering: Supplied-Reference Handbook”, 7e, NCEES
“The Grid”, by Phillip Schewe. Joseph Henry Press, 2007.
“UGLY’s Electrical References”, Revised 2005 edition by Hart; edited by Buchanan

Course This course provides scientists and engineers with a background in electronics and electronic instrumentation. Topics include DC and AC circuit analysis, frequency response, filters, feedback, operational amplifiers, semiconductor devices, power supplies, oscillators, logic gates, codes for numbers and symbols, combinational and sequential digital logic design, timing, transducers, and analog-digital conversion, and an introduction to electric machines The course consists of lecture, demonstration, discussion, and laboratory.

Prerequisites A minimum grade of C- in PHYS 112

Course Objectives Understand the physical and engineering principles underlying analog and digital electronics as demonstrated by exams, tests, and classroom participation. (a, e)

Ability to apply the above principles to the design and analysis of systems for data acquisition, processing, and control as demonstrated in homework and labs. (e)

Ability to communicate effectively as demonstrated by lab project. (g)

Learning Outcomes Upon successful completion of the course, the student will be able to:

- Skills:**
- Analyze the response of linear circuits with DC and AC inputs.
 - Use signal generators, oscilloscopes, power supplies, and multimeters.
 - Create linear models for a signal source, sink, filter, and simple active devices.
 - Design basic signal conditioning circuits for transducers.
 - Design basic power supplies.
 - Design Op-Amp circuits for basic signal processing.
 - Use complex numbers to represent signals.

- Knowledge:
- Explain physical construction & properties of electrical & electronic components.
 - Explain physical phenomena used in common transducers.
 - Explain Fourier series and transform techniques for representing signals.
 - Explain the use of freq. response & Bode plots to characterize linear systems.
 - Explain the basic operation of DC and AC electromechanical devices.

- Attitudes:
- Exhibit concern for the safety of themselves and others.
 - Exhibit efficient use of time and resources.
 - Exhibit courtesy to classmates, faculty and staff.
 - Exhibit personal integrity.
 - Exhibit desire for clear communication.
 - Exhibit desire to achieve.

Course Expectations The instructor will lecture and **facilitate** learning. Class participation is required. You are responsible for **reading the text** and **understanding** the material. All assignments are due on the assigned date. **NO** late assignments or labs accepted.

Preliminary Schedule

Meeting		Date	Topic	Text Chapter	Exams
1	W	9-Sep	Begin Class	C2	
2	F	11-Sep	Fundamentals	C2	
3	M	14-Sep	Fundamentals	C2	
4	W	16-Sep	Fundamentals	C2	
5	F	18-Sep	Network anal: NV	C3	
6	M	21-Sep	Network anal: NV	C3	
7	W	23-Sep	Thev. & Nort.	C3	
8	F	25-Sep	E1 , AC networks	C4	Exam 1 – C2 & C3
9	M	28-Sep	AC networks	C4	
10	W	30-Sep	AC networks	C4	
11	F	2-Oct	AC networks	C4	
12	M	5-Oct	AC networks	C4	
13	W	7-Oct	Systems & Frequency	C6	
14	F	9-Oct	E2 , Systems & Freq.	C6	Exam 2 – C4
15	M	12-Oct	Systems & Frequency	C6	
16	W	14-Oct	Systems & Frequency	C6	
17	F	16-Oct	AC Power	C6	
18	M	19-Oct	AC power	C7	
19	W	21-Oct	AC power	C7	
20	F	23-Oct	AC power	C7	
21	M	26-Oct	AC power	C7	
22	W	28-Oct	E3 , Op Amps	C8	Exam 3 – C6 & 7
	F	30-Oct	Fall break		
23	M	2-Nov	Op Amps	C8	
24	W	4-Nov	Op Amps	C8	

25	F	6-Nov	Op Amps	C8	
26	M	9-Nov	Transient analysis	C5	
27	W	11-Nov	Transient analysis	C5	
28	F	13-Nov	E4 , Transient analysis	C5	Exam 4 – C5 & C8
29	M	16-Nov	Electric machines	C18	
30	W	18-Nov	Electric machines	C18	
31	F	20-Nov	Electric machines	C18	
32	M	23-Nov	Electric machines	C18	
33	W	25-Nov	Electric machines	C18	
		26 – 29 Nov	Thanksgiving		
34	M	30-Nov	Electric machines	C18	
35	W	2-Dec	Electric machines	C19	
36	F	4-Dec	Electric machines	C19	
37	M	7-Dec	Electric machines	C19	
38	W	9-Dec	Electric machines	C19	
39	F	11-Dec	E5 , Electric machines	C19	Exam 5 – C18 & C19
	M	14-Dec	Study Day		
	W	16-Dec	E5 due by noon		
	TH	17-Dec	Portfolio due noon		

Lab Schedule (Steve Albers)

Lab Week	Date	Lab	Topic
Lab 1	14-Sep	A1	<i>Linear math, Tool & Safety</i>
Lab 2	21-Sep	A2	Resistance is not futile
Lab 3	28-Sep	A3	<i>Complex numbers and Trig, Thevenin</i>
Lab 4	5-Oct	A4	AC Circuits
Lab 5	12-Oct	A5	Systems and Frequency
Lab 6	19-Oct	I1	Independent project 1
Lab 7	26-Oct	A6	Power Supplies
Lab 8	2-Nov	A7	Op Amps
Lab 9	9-Nov	I2	Independent project 2
Lab 10	16-Nov	A8	More Op Amps
Lab 11	23-Nov	E1	Electrical Machines 1
Lab 12	30-Nov	E2	Electrical Machines 2
Lab 13	7-Dec	I3	Independent project 3
Finals	14-Dec	Finals	Independent project presentations

Portfolio See the portfolio handout (HO) (100 points)

Learning Exercises LEs and their solutions for each chapter will be posted in Black Board.
Your task is to master the LE material.

Lab Report The independent project will require a full lab report. The format will be

- **Introduction:** containing the project objectives, why selected, an explanation of appropriate EE and physics background material, and any additional information needed for the introduction.
- **Experiment:** setup description and appropriate discussion
- **Results and Discussion:** Explanation of experimental results & comparison with expected theory and experimental data. Discussion of possible sources of error that lead to deviation of experimental data from theoretically expected results. Discussion of any graphs, tables, and so forth necessary to explain data.
- **Conclusion:** Summary and possible applications. Include lessons that were learned.
- **References**
- **Appendix:** Include experimental data and any calculation derivations that might help explain text equations used in the body of the report. The independent project will also require a full report plus a 20 minute presentation. More details as the semester proceeds

Points	5 Exams	100 points each for a total of 500 points
	Weekly HW	About a problem a day. 3 points per problem = ~300 pts.
	10 labs	30 points each for a total of 300 points
		150 points for the independent project
	Portfolio	100 points
	Total points	$500 + 300 + 300 + 150 + 100 = 1400$

Grading Policy	95 – 100%	A
	90 – 94%	A-
	85 – 89%	B+
	80 – 84%	B
	75 – 79%	B-
	70 – 74%	C

Related Course ENGR-345 & 346 Electronics I & II

Academic Integrity All students are expected to understand and follow University of St. Thomas policies on Academic Integrity. These are described at:
www.stthomas.edu/policies/student_policy_book/Academic_rights_and_procedures.htm

Attendance Policy Students are expected to attend all class sessions. Circumstances which prevent attendance will be honored up to two instances. Absences in excess of two times may result in an incomplete grade for the course. **Contact the instructor when a special situation arises. All absences require that the instructor be informed in advance.**

Other See me if you are hungry and thirsting for more ☺

Instructor Biography See <http://www.stthomas.edu/engineering/faculty/gsmowry.htm>

Special Needs: Qualified students with documented disabilities who may need classroom accommodations should make an appointment with the Enhancement Program – Disability Services office during the first two weeks of the term. Telephone appointments are available to students as needed. Appointments can be made by calling 651-962-6315 or 800-328-6819, extension 6315. You may also make an appointment in person in O’Shaughnessy Educational Center, room 119. For further information, you can locate the Enhancement Program at <http://www.stthomas.edu/enhancementprog/>.