

ENGR-350: Introduction to Electronics

Fall Semester 2007, 4 credits

Instructor Dr. Greg Mowry (Greg)

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Class Lecture MWF, 8:15 – 9:20 AM, in OWS LL-54
Lab Instructor: Audrey Royer. All associated labs located in OSS LL-09 on T/TH.

Office Hours MWF from 10:30 AM to 12:00 or set up an 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 Description 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, transducers, and electric machines. Some digital will also be covered. 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. (EE8, EE10)

Ability to apply these principles to the design and analysis of systems for data acquisition, processing, and control as demonstrated in homework and labs. (EE7, EE8)

Ability to analyze devices, problems, tests, and documents, as demonstrated in class and labs. (EE3, EE4, EE8, EE9, EE12)

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. (EE8)
 - Use signal generators, oscilloscopes, power supplies, and multimeters. (EE11)
 - Create linear models for a signal source, sink, filter, and simple active devices. (EE8)
 - Design basic signal conditioning circuits for transducers. (EE4)
 - Design basic power supplies. (EE4)
 - Design Op-Amp circuits for basic signal processing. (EE4)
 - Use complex numbers to represent signals. (EE8, EE9)

- Knowledge:
- Explain physical construction & properties of electrical & electronic components. (EE8)
 - Explain physical phenomena used in common transducers. (EE8)
 - Explain Fourier series and transform techniques for representing signals. (EE9)
 - Explain the use of freq. response & Bode plots to characterize linear systems. (EE8, 9)
 - Explain the basic operation of DC and AC electromechanical devices. (EE8)

- Attitudes:
- Exhibit concern for the safety of themselves and others. (EE13)
 - Exhibit efficient use of time and resources. (EE13)
 - Exhibit courtesy to classmates, faculty and staff. (EE13)
 - Exhibit personal integrity. (EE13)
 - Exhibit desire for clear communication. (EE12)
 - Exhibit desire to achieve. (EE15)

Course The instructor will lecture and facilitate learning. Class participation is expected.

Methodology You are responsible for reading the text and understanding the material. All assignments are due one week after the assigned date. No late assignments or labs accepted.

Schedule

Meeting		Date	Topic	Text Chapter	Exams
1	W	5-Sep	Class intro & start	C2	
2	F	7-Sep	Fundamentals	C2	
3	M	10-Sep	Fundamentals	C2	
4	W	12-Sep	Fundamentals	C2	
5	F	14-Sep	E1 , Network analysis	C3	Exam 1 – C2
6	M	17-Sep	Network analysis	C3	
7	W	19-Sep	Network analysis	C3	
8	F	21-Sep	E2 , Network analysis	C3	Exam 2 – C3
9	M	24-Sep	AC networks	C4	
10	W	26-Sep	AC networks	C4	
11	F	28-Sep	AC networks	C4	
12	M	1-Oct	AC networks	C4	
13	W	3-Oct	AC networks	C4	
14	F	5-Oct	E3 , Systems & Freq.	C6	Exam 3 – C4
15	M	8-Oct	Systems & Frequency	C6	
16	W	10-Oct	Systems & Frequency	C6	
17	F	12-Oct	E4 , Systems & Freq.	C6	Exam 4 – C6
18	M	15-Oct	AC power	C7	
19	W	17-Oct	AC power	C7	
20	F	19-Oct	AC power	C7	
21	M	22-Oct	AC power	C7	
22	W	24-Oct	AC power	C7	
	F	26-Oct	Fall break		
23	M	29-Oct	Transient analysis	C5	
24	W	31-Oct	Transient analysis	C5	
25	F	2-Nov	E5 , Transient analysis	C5	Exam 5 – C7 & C5
26	M	5-Nov	Op amps	C8	
27	W	7-Nov	Op amps	C8	
28	F	9-Nov	Op amps	C8	
29	M	12-Nov	Op amps	C8	
30	W	14-Nov	Diodes and apps	C9	
31	F	16-Nov	E6 , Electric machines	C18	Exam 6 – C8 & C9
32	M	19-Nov	Electric machines	C18	
33	W	21-Nov	Electric machines	C18	
		22 – 23 Nov	Thanksgiving break		
34	M	26-Nov	Electric machines	C18	
35	W	28-Nov	Electric machines	C19	
36	F	30-Nov	E7 , Electric machines	C19	Exam 7 – C18
37	M	3-Dec	Electric machines	C19	
38	W	5-Dec	Electric machines	C19	

39	F	7-Dec	Electric machines	C20	
40	M	10-Dec	Electric machines	C20	
41	W	12-Dec	Electric machines	C20	
42	F	14-Dec	E9 , Electric machines	C20	Exam 8 – C19 & C20
		18 – 21 Dec	E9 due during finals		

Lab	Date (Lab sections)	Lab	Topic
	4 or 6 Sep	No labs this week	First week ☺
Lab 1	11 or 13 Sep	A1	Tools of the trade
Lab 2	18 or 20 Sep	A2	Resistance is not futile
Lab 3	25 or 27 Sep	A3	Thevenin
Lab 4	2 or 4 Oct	A4	AC circuits
Lab 5	9 or 11 Oct	A5	Systems & frequency
Lab 6	16 or 18 Oct	A6	Power supplies
Lab 7	23 or 25 Oct	I1	Independent project 1
Lab 8	30 Oct or 1 Nov	A7	Transient analysis
Lab 9	6 or 8 Nov	I2	Independent project 2
Lab 10	13 or 15 Nov	A8	Op amps
	20 or 22 Nov	No labs this week	Thanksgiving ☺
Lab 11	27 or 29 Nov	E1	Electric machines 1
Lab 12	4 Dec or 6 Dec	E2	Electric machines 2
Lab 13	11 Dec or 13 Dec	I3	Independent project 3

Portfolio Your portfolio will include all of your course material such as homework, exams, research paper, and any extra credit exercises organized in a neat and readable manner. Please put your solutions in numerical order. The portfolio should be in a 3-ring binder and organized with dividers and a table of contents. Your portfolio is due at the end of the period of the last exam and **must incorporate** a short write up that references course work (e.g. homework, labs, and exams) explaining how you met the course objectives and outcomes. (50 points)

Homework Homework problems and their solutions for each chapter will be posted in Black Board. Your task is to master the homework material

Lab Reports Lab 10 will require a full lab report with a format like: (1) Introduction containing the lab objectives, explanation of appropriate EE and physics background material, and any additional information needed for an introduction; (2) Experimental setup description and appropriate discussion; (3) Explanation of experimental results & comparison of expected theory and experimental data. Discussion of possible sources of error which lead to deviation of experimental data from theoretically expected results. Discussion of any graphs, tables, and so forth necessary to explain data. (4) Conclusion, summary and possible applications; (5) Appendix which incorporates experimental raw data sheet and data. The independent project will also require a full report plus a 20 minute presentation. More details can be found in the lab handouts.

Points	8 Exams	100 points each for a total of 800 points
	Weekly HW	About a problem a day. 3 points per problem = ~300 pts.
	11 labs	50 points each for 9 of 11 labs for a total of 450 points
		100 points for Lab 9
		150 points for the independent project
	Portfolio	50 points
	Total points	$800 + 300 + 700 + 50 = 1850$

Grading	95 – 100%	A
Policy	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.**

Bibliography See me if you are hungering 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/>.