

Electrical and Computer Engineering 2250
Syllabus – Fall 2016

Course Title: Electrical circuits

Description: Introduction to circuit theory, analysis and design for Electrical and Computer Engineering majors.

Instructor: Paul A. Wheeler

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Office Hours: 9:00 – 10:00 Monday, Wednesday, Friday

Class Time: Monday Wednesday Friday 10:30 – 11:20 in ENGR 302

Lab: Tuesday 7:30 – 10:15 and 10:30 – 1:15; Thursday 10:30 – 1:15 and 1:30 – 4:15 in EL 102A

Textbook: Electric Circuits, 10th Edition by James W. Nilsson and Susan Riedel

Grader/lab instructors: TBD

Prerequisites or Co-requisite: Math 2220 (Linear Algebra) or equivalent

Class Web Page: [<http://canvas.usu.edu>] The Canvas site contains the course syllabus, class schedule, homework assignments and laboratory assignments.

Outcomes: A list of course outcomes and how student progress on the course outcomes will be assessed is attached.

Calculator/Computer: A scientific calculator is required. The ability to solve matrix equations with the calculator is highly desirable.

Spice: The use of the Simulation Program with Integrated Circuit Emphasis (SPICE) will be an integral part of the course. We will use the LTSpice package from Linear Technology or as an alternative the Windows software package Cadence OrCAD PSpice Package. Free editions of the software are available from either company's web sites and will be suitable for the course. The full professional version of the Cadence software tools are available in the Engineering Computer Lab.

Homework: Problems will be assigned every class period and will be due at the beginning of class in two lectures (Monday homework will be due the following Friday, Wednesday on the following Monday, and Friday homework will be due on the following Wednesday). Homework must be neat and follow the attached format. Late work and work which does not follow the given format will not be accepted.

Examinations: Three in-class tests and a final exam will be given. The final exam will be weighted the equivalent of two in-class exams. The scores will be normalized by the highest student's score (at the instructor's discretion). Students may use a single 3x5 card with any hand written notes that they feel are needed during the exam. The 3x5 note cards from previous in-class exams may also be used on later exams and the final.

Final Exam: The final exam will be given on Friday, December 16, 2016 at 9:30 a.m. to 11:20 a.m. A portion of this exam will be a comprehensive review of the material presented in the class.

Grading: The scores will be weighted as follows:

Homework and Quizzes 15%

Lab 15%

Tests and Final 70%

The final grades will be computed as follows. The scores will be normalized by the highest student's score (at the instructor's discretion) with score X. Grades are assigned as:

A > 93% of X

A- > 90% "

B+ > 87% "

B > 84% "

B- > 80% "

C+ > 77% "

C > 74% "

C- > 70% "

D+ > 67% "

D > 64% "

D- > 60% "

F < 60% "

Grades for the individual in-class exams will be calculated in the same manner.

Class Schedule: An approximate schedule for the class is attached. Dates for tests are noted as well as when laboratory exercises will be held. A list of assigned homework problems is provided. Deviations from this schedule will be posted on Canvas and announced in class.

Disabilities: In cooperation with the Disability Resource Center, reasonable accommodation will be provided for qualified students with disabilities. Please meet with the instructor during the first week of class to make arrangements. Alternate format print materials (large print, audio, diskette or Braille) will be available through the Disability Resource Center.

ECE 2250 Course Outcomes – Fall 2016

A. Outcome	Measurement Device
1. Understand circuit fundamentals, including Ohm's, Kirchoff's, and power conservation laws.	Assessed by labs, homework and exams.
2. Have the ability to write loop current and node voltage equations for arbitrary networks including resistors, capacitors, inductors, dependent and independent sources and solve them for DC circuits.	Assessed by labs, homework and exams.
3. Ability to formulate Norton and Thevenin equivalent circuits at an arbitrary interface set of points for complex networks including dependent and independent sources.	Assessed by labs, homework and exams.
4. Ability to solve for currents, voltages and power in circuits containing ideal op---amps in inverting, noninverting, summing and differencing configurations. Ability to design simple op---amp circuits.	Assessed by homework and exams.
5. Ability to find time constants, initial and final values and the complete responses for first---order RC and RL circuits containing switches, step and pulse sources.	Assessed by labs, homework and exams.
6. Ability to use lab instruments including oscilloscopes, power supplies, multimeters and function generators.	Assessed in labs.
7. Ability to use circuit simulation / analysis software for DC and transient analysis.	Assessed in homework and in labs.

ECE 2250 Schedule (Fall 2016)

Lecture	Date	Day	Sections	HW#	Date Due	Assessment	Problems
1	29-Aug	Mon	Syllabus, 1.1, 1.2	HW1	2-Sep	1.1, 1.2	1.1, 1.3
Lab	30-Aug	Tue	Lab Safety		13-Sep		
2	31-Aug	Wed	1.3, 1.4, 1.5, 1.6	HW2	7-Sep	1.3, 1.5	1.14, 1.15, 1.27
3	2-Sep	Fri	2.1, 2.2	HW3	9-Sep	2.1, 2.2, 2.3, 2.4	2.4, 2.9, 2.11
	5-Sep	Mon	Labor Day (no class)				
Lab	6-Sep	Tue	Lab 1		20-Sep		
4	7-Sep	Wed	2.3, 2.4	HW4	12-Sep	2.5, 2.6, 2.7	2.13, 2.15, 2.17
5	9-Sep	Fri	2.5	HW5	14-Sep	2.9, 2.10	2.33, 2.35
6	12-Sep	Mon	Spice Lecture	HW6	16-Sep		2.22, 2.25, 2.26, 2.35
Lab	13-Sep	Tue	Lab 2		27-Sep		
7	14-Sep	Wed	3.1, 3.2	HW7	19-Sep	3.1	3.3, 3.4, 3.5, 3.6, 3.7
8	16-Sep	Fri	3.3, 3.4	HW8	21-Sep	3.2, 3.3, 3.4	3.12, 3.14, 3.18
9	19-Sep	Mon	3.5, 3.6, 3.7	HW9	23-Sep	3.5, 3.6, 3.7, 3.8	3.29, 3.37, 3.61
Lab	20-Sep	Tue	No Lab				
10	21-Sep	Wed	Review				
11	23-Sep	Fri	Test 1 (Ch1-Ch3)				
12	26-Sep	Mon	Review Test, 4.1				
Lab	27-Sep	Tue	Lab 3		11-Oct		
13	28-Sep	Wed	4.2, 4.3	HW10	3-Oct	4.1, 4.2, 4.3	4.12, 4.13, 4.17
14	30-Sep	Fri	4.4	HW11	5-Oct	4.4, 4.5, 4.6	4.23, 4.26
15	3-Oct	Mon	4.5, 4.6	HW12	7-Oct	4.7, 4.8, 4.9	4.33, 4.34, 4.39
Lab	4-Oct	Tue	No Lab				
16	5-Oct	Wed	4.7	HW13	10-Oct	4.10, 4.11, 4.12	4.47, 4.52
17	7-Oct	Fri	4.8, 4.9	HW14	12-Oct	4.13, 4.14, 4.15	4.61, 4.62, 4.63
18	10-Oct	Mon	4.10, 4.11	HW15	14-Oct	4.16, 4.17, 4.18, 4.19	4.66, 4.80
Lab	11-Oct	Tue	Lab 4		25-Oct		
19	12-Oct	Wed	4.12	HW16	17-Oct	4.21	4.82, 4.85
20	14-Oct	Fri	4.13	HW17	19-Oct		4.93, 4.95, 4.97
21	17-Oct	Mon	Review				
Lab	18-Oct	Tue	No Lab				
22	19-Oct	Wed	Test 2 (Ch 4)				
	21-Oct	Fri	Fall Break (no class)				
24	24-Oct	Mon	Test Review				
Lab	25-Oct	Tue	Lab 5		8-Nov		
25	26-Oct	Wed	5.1, 5.2	HW18	31-Oct	5.1	5.1, 5.4, 5.6
26	28-Oct	Fri	5.3, 5.4	HW19	2-Nov	5.2, 5.3	5.9, 5.14, 5.16
27	31-Oct	Mon	5.5, 5.6	HW20	4-Nov	5.4, 5.5	5.20, 5.28, 5.35
Lab	1-Nov	Tue	No Lab				
28	2-Nov	Wed	Op-Amps, Adv Pspice	HW21	7-Nov		5.39, 5.40, 5.41
29	4-Nov	Fri	Op-Amp Design		9-Nov		
30	7-Nov	Mon	6.1	HW22	11-Nov	6.1	6.2, 6.5, 6.8
Lab	8-Nov	Tue	Lab 6		22-Nov		
31	9-Nov	Wed	6.2	HW23	14-Nov	6.2, 6.3	6.13, 6.15, 6.16
32	11-Nov	Fri	6.3	HW24	16-Nov	6.4, 6.5	6.22b, 6.27a, 6.35
33	14-Nov	Mon	6.4, 6.5	HW25	21-Nov	6.6	6.38, 6.39, 6.45
Lab	15-Nov	Tue	No Lab				
34	16-Nov	Wed	Review				
35	18-Nov	Fri	Test 3 (Ch5-Ch6)				
36	21-Nov	Mon	Test Review				
Lab	22-Nov	Tue	Lab 7		6-Dec		
	23-Nov	Wed	Thanksgiving (no class)				
	25-Nov	Fri	Thanksgiving (no class)		18-Nov		
37	28-Nov	Mon	7.1	HW26	2-Dec	7.1, 7.2	7.7, 7.14
Lab	29-Nov	Tue	No Lab				
38	30-Nov	Wed	7.2	HW27	5-Dec	7.3, 7.4	7.21, 7.25, 7.33
39	2-Dec	Fri	7.3	HW28	7-Dec	7.5, 7.6	7.51, 7.57, 7.61, 7.66
40	5-Dec	Mon	7.4	HW29	9-Dec		7.68, 7.69, 7.71
Lab	6-Dec	Tue	No Lab				
41	7-Dec	Wed	7.5	HW30	12-Dec	7.7, 7.8	7.72, 7.84
42	9-Dec	Fri	7.6, 7.7				
43	12-Dec	Mon	Review 9:30-11:20				
44	16-Dec	Fri	Final Exam (9:30-11:20)				

Lab: Students not performing all of the lab work will fail ECE 2250.

Grading format for the lab will be as follows:

Prelim (5 points) The preliminary work must be completed prior to the lab period and must be checked by the lab instructor within the first 15 minutes of lab for credit.

In Lab (10 points) The work to be completed in the lab will be checked by the lab instructor at the end of the lab period.

Conclusions (5 points) The completed lab and conclusions will be graded during the following lab period or at an assigned time for lab book turn in.

The lab assistant will be available during the scheduled labs and it is expected that the laboratory exercise will be completed during the scheduled time. A bound quad-ruled notebook is required for the lab. The National #43-591 is recommended because it is a convenient size. You will need to have funds on your USU card for the purchase of the various circuit components as needed in the lab. Every student must have a protoboard for use in the labs at USU. These can be purchased from the EE department store for about \$19.00.

All lab work is to be documented in the notebook using blue or black ink. You must record the work done during the lab time directly in the notebook (no scratch paper allowed). This saves time and encourages clear thinking and careful preparation. If you make a mistake, simply cross out the error and proceed.

- Pages in the notebook should be numbered, with no pages torn out and dated in the upper corner.
- A title page and a table of contents should appear at the beginning of the notebook.
- The printed hand out for each lab can be neatly glued into your notebook on the first page of the write-up for that lab.
- The format of your write-up for each lab should (usually) consist of the following sections, with appropriate titles.
 - Glued-in pages of essentials from printed hand-outs.
 - Solutions to the preliminary exercises. These are to be worked out neatly in the notebook prior to the beginning of the lab period.
 - The various procedures. Include the raw measurements, data in tables, calculations, notes on instrument settings, graphs, and diagrams of circuits as appropriate. Under each procedure write a concise description of what you did, what you were recording, or what you observed.
 - Conclusions. Summarize your findings and evaluate the results relative to the stated objectives for each lab. Also include here responses to questions posed in the hand-out.
- Whenever possible, measured data and results of calculations should be displayed in tables and graphs. These tables and graphs are to be numbered, titled, and labeled using correct units.
- Put considerable thought and effort into your evaluations and conclusions because this is the most important part of your write-up.