

UNIVERSITY OF UTAH  
ELECTRICAL AND COMPUTER ENGINEERING DEPARTMENT  
ECE 3110: Engineering Electronics II

- Meeting Times:** Mon. Wed. Fri., 8:35-9:25am in WEB 2230
- Course Website:** <http://www.ece.utah.edu/~ccharles/ece3110>
- Textbooks:** “Microelectronic Circuits,” Sedra and Smith (5th Ed.)
- Prerequisite:** ECE 2280: Fundamentals of Engineering Electronics
- Instructor:** Prof. Cameron Charles ([ccharles@ece.utah.edu](mailto:ccharles@ece.utah.edu))
- Office Hours:** Monday, Tuesday and Wednesday, 10:30-11:30am (MEB 4108)
- Grading TA:** Ondrej Novak ([onovak@eng.utah.edu](mailto:onovak@eng.utah.edu))
- Office Hours:** Wednesday, 12:15-1:45pm and Thursday, 2:00-3:30pm (MEB 2270)
- Lab TA:** Manohar Nagaraju ([manohar.nagaraju@utah.edu](mailto:manohar.nagaraju@utah.edu))
- Lab Hours:** Tuesday, 7:30-10:30am and 2:00-5:00pm, Thursday, 2:00-5:00pm (MEB 2365)

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**Course Description:**

This is the second part of the engineering electronics sequence which is designed to provide an in-depth understanding of electronic circuit design and analysis. The course will start with a review of basic circuit principles and devices, including MOSFETs and BJTs, and then move on to cover the material in Chapters 6-14 in Sedra and Smith. Specific topics that we will focus on include differential and multistage amplifiers, amplifier frequency response and feedback, output stages, power amplifiers, and MOS digital circuits. The course will emphasize manual analysis and design techniques to allow students to develop circuit analysis insight and intuition.

**Reading Assignments:**

In addition to attending lectures, students are strongly encouraged to read the relevant sections in the textbook. Reading assignments for each week will be posted to the course website (under **Lectures**), and can be read either before or after the lecture. Seeing the material for a second time will greatly enhance your understanding of the concepts.

**Homework Assignments and Quizzes:**

There will be 12 homework assignments throughout the semester. Homework will be assigned on a Wednesday, and will be due (in the ECE homework lockers) one week from the following Friday (i.e., you will have 1.5 weeks to complete each assignment). **To enhance your learning in solving the problems, the final answer for each problem will be provided; the student's task will be to provide detailed steps of how the final answer is obtained.** Each homework assignment will be graded for completeness and two problems of each assignment will be selected at random for detailed grading. Complete solutions for each assignment will be posted to the website after the homework is due.

There will be 5 quizzes throughout the semester, covering the material on the homework assignments. Each quiz will consist of one or two questions and will take place in the last 15 minutes of the lecture. The student's lowest quiz and homework score will be dropped and not included in the final grade.

**Laboratory:**

There will be five lab assignments throughout the semester. Students should attend the lab section that they have registered for; however, students are also welcome to perform the labs on their own time. The benefit of completing the lab during the scheduled time is that a TA will be on hand to explain the lab, answer questions, and provide assistance. Labs will meet in MEB 2365, starting during the third week of class.

Each lab assignment has required reading in the text as well as a pre-lab with calculations that must be completed before starting measurements in the lab. **Students must attend the start of their assigned lab sections and have the lab TA verify that they have completed the accompanying pre-lab before starting the measurement part of the lab.** The pre-lab is designed to help the student relate the lab activities to concepts covered in the lectures and homework assignments.

Labs can be performed in teams of two, or individually. No lab notebook is required, but a lab report is required for each lab assignment. Templates for lab reports are provided on the course website in both Word and L<sup>A</sup>T<sub>E</sub>X formats. Lab reports are due by 6:00pm one week following the completion of each lab, and should be turned in to the ECE homework lockers. Only one lab report is required per team of two students, and both students will receive the same grade. All data used in lab reports should have been taken by you or your lab partner; using someone else's data will result in a failing grade for that lab.

**Exams:**

There will be two in-class midterm exams (Wednesday, Oct. 8 and Wednesday, Nov. 19) and one final exam (Tuesday, Dec 16, 8-10am). Students will be allowed to bring one double-sided reference sheet to each exam, as well as the reference sheet(s) prepared for the previous exams (e.g. three double-sided reference sheets will be permitted for the final exam). Calculators are permitted during exams.

**Feedback:**

I would like to obtain constructive feedback from students throughout the semester. I have set up an anonymous e-mail account on Gmail that can be used for this purpose. If you have any feedback or changes you would like made to the course content, format, labs, etc., go to <http://mail.google.com> and log in with the user name `ece3110feedback` (the password will be distributed in class). Select my e-mail address under contacts, and send me an e-mail with your suggestions.

**Grading:**

Quizzes .....	8%
Homework Assignments .....	12%
Laboratory .....	25%
Midterm Exam 1 .....	15%
Midterm Exam 2 .....	15%
Final Exam .....	25%

**Late Policy:**

Lab reports will be accepted up to 2 days late, with a 10% deduction for each day they are late. **Late homework assignments will NOT be accepted.**

**Cheating:**

Students are expected to complete homework assignments, lab reports, and exams independently (with a partner in the case of lab reports). Evidence of copying will result in a grade of zero on the assignment, report, or exam in question for a first offense, and a failing grade in the class for a second offense.

**Lecture Schedule:**

Date	Lecture Topics	Reading	Assignments	Labs
Mon. Aug. 25	Introduction, dB, small signal concepts	1.4, 1.5		
Wed. Aug. 27	Opamps, MOSFET review	2.1-2.3, 4.1-4.5	HW 1 out	
Fri. Aug. 29	MOSFET review	4.6-4.7		
Mon. Sept. 1	No class (Labour Day)			
Wed. Sept. 3	BJT review	5.1-5.7, 6.2	HW 2 out	
Fri. Sept. 5	Current mirrors, Diff. pair	6.3.1, 6.3.2, 7.1.1, 7.1.2	HW 1 due	
Mon. Sept. 8	Diff. pair	7.1.3, 7.2		Lab 1
Wed. Sept. 10	Diff. pair, active loads	7.4.1, 6.5.1, 6.5.2	HW 3 out	
Fri. Sept. 12	Small signals and biasing	4.6	HW 2 due, Quiz 1	
Mon. Sept. 15	High freq. effects	4.8, 4.9		Lab 2
Wed. Sept. 17	S.S. example, Diff. pair with active load	7.5.1-7.5.4	HW 4 out	
Fri. Sept. 19	Multi-stage amps, Freq. resp.	7.7.1, App. E	HW 3 due	
Mon. Sept. 22	3-dB points, OCTC	6.4.2, 6.4.3		
Wed. Sept. 24	Miller's theorem, Feedback	6.4.4, 8.1	HW 5 out	
Fri. Sept. 26	Review of frequency concepts	App. E	HW 4 due, Quiz 2	
Mon. Sept. 29	Neg. Feedback, stability	8.2, 8.8, 8.9		Lab 3
Wed. Oct. 1	Bode plots for stability analysis	8.10	HW 6 out	
Fri. Oct. 3	Midterm I Review		HW 5 due	
Mon. Oct. 6	Freq. compensation	8.11		Lab 3
Wed. Oct. 8	Midterm Exam I		Midterm I	
Fri. Oct. 10	Freq. comp. example			
Mon. Oct. 13	No class (Fall break)			
Wed. Oct. 15	No class (Fall break)			
Fri. Oct. 17	No class (Fall break)			
Mon. Oct. 20	2-port network parameters	App. B		Lab 4
Wed. Oct. 22	Series-shunt feedback	8.3.1, 8.4	HW 7 out	
Fri. Oct. 24	Series-series feedback	8.3.3, 8.5	HW 6 due, Quiz 3	
Mon. Oct. 27	Data converter concepts	9.7, 9.8.1		Lab 4
Wed. Oct. 29	Data converter implementations	9.8.2 9.9.1-9.9.3	HW 8 out	
Fri. Oct. 31	Data converter example		HW 7 due	
Mon. Nov. 3	Rectifiers and Oscillators	13.9.1-13.9.2, 13.1.1-13.1.3		Lab 5
Wed. Nov. 5	Bistable multivibrators	13.4.1-13.4.5, 13.5	HW 9	
Fri. Nov. 7	Bistable multivibrators		HW 8 due, Quiz 4	
Mon. Nov. 10	Digital circuit concepts	10.1.1, 10.1.2		Lab 5
Wed. Nov. 12	Digital design, CMOS inverter	10.1.3, 10.1.4, 10.2.1	HW 10 out	
Fri. Nov. 14	Midterm II Review		HW 9 due	
Mon. Nov. 17	Review examples			Lab 6
Wed. Nov. 19	Midterm Exam II		Midterm II	
Fri. Nov. 21	CMOS inverter	10.2.2-10.2.4		
Mon. Nov. 24	CMOS example			
Wed. Nov. 26	CMOS logic gates	10.3	HW 11 out	
Fri. Nov. 28	No class (Thanksgiving)		HW 10 due	
Mon. Dec. 1	Output stages	14.1		Lab 6
Wed. Dec. 3	Class A stage	14.2	HW 12 out	
Fri. Dec. 5	Class B stage	14.3	HW 11 due, Quiz 5	
Mon. Dec. 8	Review examples			Lab 6
Wed. Dec. 10	Research Presentation			
Fri. Dec. 12	Final Exam Review		HW 12 due	
Tues. Dec. 16	Final Exam, 8-10am in WEB 2230		Final Exam	