ES 330: Electronics II

Course Outline
Fall '10

Instructor:
Dr. Mohammad Rafiqul Haider, Ph. D. Email: haider@sonoma.edu

Day: Friday (Theory), Wednesday (Lab)
Times: Friday: 9:00 am to 10:50 am, Wednesday: 9:00 am to 11:50 pm
Location: Salazar Hall 2003

Office Hours: Monday, Tuesday and Thursday (11:00 – 12:00), Wednesday (5:00 - 6:00)

Office: 2010B Salazar Hall
Phone: (707)664-3462
Pre-Requisite: ES 230 and 231 or by instructor's approval

Course Description:

This course covers single and multi-stage amplifiers, design and analysis, low and high frequency responses, active filters, non-linear circuits, electronic current sources, simulation using SPICE and analysis of uA741 op-amp.

Course Text Book:
R. C. Jaeger and T. N. Blalock, *Microelectronic Circuit Design*, 3rd Ed., Mcgraw Hill.

Reference Books:
[1] Grey, Hurst, Lewis and Meyer, *Analysis and Design of Analog Integrated Circuits*, 4th Ed. Wiley.
[2] Sedra and Smith, *Microelectronic Circuits*, Oxford University Press.
[3] B. Razavi, *Design of Analog CMOS Integrated Circuits*, Tata McGraw Hill
[4] R. J. Baker, H. W. Li and D. E. Boyce, *CMOS Circuit Design, Layout and Simulation*, Prentice Hall.
[5] B. Razavi, *RF Microelectronics*, Prentice Hall.
[6] Franco Maloberti, *Analog Design for CMOS VLSI Systems*, Kluwer Academic Press

Book on PSPICE:
Gordon Roberts and Adel Sedra**,** *SPICE* (2nd edition)**,** The Oxford Series in Electrical and Computer Engineering

Point distribution	
Examinations	**Percentage**
Midterm @ 100 point	**20%**
Final @ 100 point	**20%**
4 Projects @ 50 point	**40%**
Attendance	**10%**
Quiz and Homework	**10%**
Total	**100%**

Grading Scale	
90-100%	**A**
80-89%	**B**
70-79%	**C**
60-69%	**D**
0-59%	**F**

Class Policy:

All teaching guidelines and policies of SSU apply to this class. In order to get credit for an exam the student must notify the instructor prior to a class session if they will be unable to attend (and reschedule for a different date).

Attendance:
Attendance is mandatory. There will be no excused absences except in the case of emergencies that could be substantiated.

Examinations:
Each student is expected to keep up with the assignments. Examinations are based upon theory and practice material and may include multiple choice, true/false, short answers, and problems. Exams and projects marks will be scaled to take into account the overall class performance.

Projects and Laboratory Experiments:

Four projects will be assigned during the semester. Each project is usually a combination of previous two lab experiments. At the end of each lab experiment, students must show their results before leaving the class. There will be a **10% mark deduction for each late submission**. The project report must be in the specified format. The format will be provided by the instructor. The project topic will be chosen by the instructor in collaboration with the student.

Policy on the Submission of Project Work:
1. All projects must be done individually unless instructed otherwise.
2. Tables and graphs in the project submissions must be neat and clean with proper explanation.
4. Each project submission is due at the beginning of the class on the specified date.

Failing to do any of the above, a submission may not be accepted resulting in the loss of grade in that assignment.

Success:
To be successful in this class we suggest the following:

- Attend all classes (or communicate to the instructor)
- Listen attentively
- Take notes
- Participate in discussions
- Attempt all homework
- Form study groups

Class Schedule:

Class	Topic	**Reference**
1	Review: Single stage amplifier, Multi-stage ac-coupled amplifier	**3-5, 13, 14, Appdx**
2	Multi-stage ac-coupled amplifier, DC-coupled multistage, Output stages	**14.8, 15.3**

3	Feedback concept, Non-linear circuit applications, oscillators, Non-ideal op-amps	**11.5, 11.6, 12.1 – 12.3**
4	Differential amps (bipolar), dc analysis, transfer characteristics, ac analysis, Differential & common-mode	**15.1**
5	Analysis using half-circuits, MOSFET differentials	**15.1**
6	Two-stage op-amp	**15.2**
7	**Mid Term Examination**	
8	Electronic current sources, Monolithic IC concepts, current-element matching MOS transistor current mirror	**15.4, 15.5, 15.6**
9	Buffered current mirrors, output resistance, two-port model, Widlar current-source, High-output-resistance current mirrors	**15.6, 15.7**
10	Reference current generation, current mirror as active loads, Active loads in op-amp	**15.8, 15.9, 15.10**
11	741 op-amp examples, Frequency response, low-frequency calculations	**15.11, 16.1**
12	High frequency models and calculations, Short-circuit time constant method	**16.1, 16.2, 16.3**
13	Transistor models at high frequencies, Base resistance in hybrid-π model, High-frequency analysis	**16.4, 16.5, 16.6, 16.7, 16.8**
14	Frequency response of single-stage and multi-stage amplifiers, Tuned amplifiers	**16.9, 16.10, 16.11**
15	**Review**	
16	**Final Examination**	

Outcomes:
By attending this course students will learn

1. an ability to apply knowledge of mathematics, science, and engineering
2. an ability to design a system, component, or process to meet desired needs within realistic constraints
3. an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

Academic Honesty:
You are responsible to behave ethically & honestly. Copying, cheating, forgery, and other unethical or dishonest actions are not tolerated.
See http://www.sonoma.edu/uaffairs/policies/cheating_plagiarism.htm

Important Dates:

- September 8, last day to add
- September 20, Last day to Drop with 'W' (done online)
- November 5, Last day to Petition to Withdraw from a Class