EEL 4301L
Section 01/03
Spring 2008

Course Information:

- Prerequisites: EEL 3300 & EEL 3300L (Electronics I w/ lab)
- Co-requisites: None
- Course Outline: 9 experiments, 2 exams, and 1 design project (13 weeks total).
- Grading Policy (subject to change):
  - Lab Reports   →   40%
  - Exams   →   20%
  - Notebook   →   10%
  - Prelabs   →   10%
  - Design Project   →   10%
  - Performance   →   10%
  - Grading Scale:
    $$A \geq 90\%$$
    $$89\% \geq B \geq 80\%$$
    $$79\% \geq C \geq 70\%$$
    $$69\% \geq D \geq 60\%$$
    $$F \leq 59\%$$

Course Instructional Objectives:

1. Become familiar with CMOS inverter.
2. Employ BJT in common-collector (emitter follower) configuration, observe voltage buffering characteristics of the circuit, and measure approximate values of small-signal input & output resistance of the circuit.
3. Setup and analyze BJT current mirrors (Wilson & Widlar current sources).
4. Construct BJT differential amplifier circuits and measure differential & common mode gains for partial differential and pure common mode amplifiers to calculate common-mode rejection ratio (CMRR).
5. Design a 3-stage direct-coupled BJT amplifier and observe/correct the common problems encountered while setting bias points for each stage.
6. Study and compare different power amplifier classes (A, B, AB).
7. Observe & measure frequency response for different low pass filters (1st order passive, 1st & 2nd order active).
8. Build oscillator circuits based on operational amplifiers (Wien Bridge & Schmitt Trigger oscillators).
9. Demonstrate knowledge and skills acquired while performing experiments to successfully complete the design project.

Lab Policies:

- Students are expected to show up to lab on time. Extenuating circumstances should be reported to the TA prior to the beginning of lab, and only with the TA's consent is a student allowed to show up to lab late.
- Students are to perform lab experiments in groups no larger than two. Students who do not have a partner must work alone.
- Prelabs are to be completed before coming into lab. The TA must sign off on the prelab work before the experiment begins. Failure to do so will result in zero points for that prelab. Prelab work should be done in the notebook, unless otherwise instructed.
- Students are required to bring their own circuit components and breadboard to perform lab experiments (with the exception of measuring devices and signal generators). Students can easily find the required components to specific experiments by reading through the procedure before coming to lab. Components can be purchased at Radio Shack and other electronic stores in town.
- Make sure the TA signs off on the completed work for each experiment before leaving lab.
- Each experiment will require a lab report. Each student has to submit a typed individual report. All reports are due the following week before the lab session is started. No students should have identical wordings on lab reports; copying someone else's work is a violation to the honor code and can be severely punished if committed.
- Lab reports turned in after the due date and time are deducted points (10 points for each day late the first 3 days, reports not accepted after three days late).
- Lab experiments should be finished in the 2 hour, 45-minute allotted time. Alternate time slots can be arranged under extenuating circumstances.
- No eating or drinking in the lab.
- No cell-phone use allowed.
- Report any malfunctioning equipment to TA.
- Students are expected to clean their working space before leaving lab.

Lab Notebook:

- Each student must bring a bounded 'Composition' notebook (no spiral or loose page notebooks are allowed).
- Each page should be numbered on the top right corner starting on the second page (front of the page only).
- All notebook entries must be done in ink (no pencils allowed).
- Use only front side of the pages for data entries. The back of the pages can only be used to paste printed out circuits, graphs, or other printed literature.
- First page of the notebook is the Index (include experiment #, experiment title, date, and page #).

- Notebooks should have all the prelabs and information collected during lab experiments.
- Notebooks at the end of the semester should be well-organized, clean, no loose pages, and include complete data entries and all the signatures in place to get full credit.

Lab Reports:

Lab reports should contain the following sections:

1. <u>Cover Page</u>: All reports should have a cover page with the student name, partner, course and section number, lab experiment number and title, date experiment performed, and date report submitted.
2. <u>Introduction</u>: List the experiment objectives and include a brief description of the experiment that was performed, as well as the characteristics and functions of the circuit used during the experiment.
3. <u>Procedure</u>: This section may be omitted if the procedure is taken from a web page. Refer the source from where the procedure was taken (experiment completed and exact URL).
4. <u>Circuits Designed & Results</u>: Present results collected during lab, including all the circuits with circuit values used as well as graphs captured from the oscilloscope. Circuits, figures, and graphs should always be labeled.
5. <u>Data Analysis</u>: Perform all the calculations on the collected data. Show all calculations and equations. Display equations and calculations using Microsoft Equation.
6. <u>Discussion</u>: Include a detailed analysis of calculated results from the previous two sections vs. expected/theoretical results. Discuss any reasons for discrepancies between results. Some graphs may be included in discussion section to better illustrate a point.
7. <u>Conclusion</u>: Provide a specific, thoughtful conclusion to the results of the experiment, such as lessons learned, possible applications, etc. At no time should meaningless statements such as "I really learned a lot", "This lab really helped me learn", "Everything came out as expected", etc. be used.

**Lab reports should always be in the third person. Never use 'I', 'you', 'we', etc.