This capstone course will cover the design and analysis of integrated circuit amplifiers. Much of the course will involve the extensive use of computer aided design tools such as SPICE, and PSpice programs. A solid background in circuits analysis and electronics (such as that presented in EE430) is a necessary course pre-requisite. A semester long project to design an integrated circuit amplifier will be a key part of this heavily design oriented course.

**COURSE ADMINISTRATION**  *The last day to drop class is September 16, 2002. No late drops!*

Students will be divided into design teams of 2-3 each. They will be expected to work collaboratively throughout the design (using SPICE) of the input, gain, and output stages of an operational amplifier. Four reports of their work will be required throughout the semester. The first three will be a group report while the fourth one will be done individually. Each member of the group will be expected to contribute equally to the overall effort because every group member will receive the same grade for the first three reports. Furthermore, a graded oral progress report by each member of the design team will be required during the semester. Lectures, assigned reading, and homework problems will partially parallel the design project.

**REQUIRED TEXTBOOK & RECOMMENDED REFERENCES**


**CLASS POLICIES & PROCEDURES**

1. Students are expected to attend all class sessions and will be held responsible for any lecture materials missed, quizzes missed, and all homework or SPICE assigned during any absences.

2. For examination class periods, absences due to non-compelling reasons will result in a zero grade on that exam. No exceptions!

3. Cheating on quizzes, exams, SPICE assignments, or the final will not be tolerated and will be punished by a zero grade on that item and possibly an automatic "F" for the course. Without exception, all such incidents will be formally reported to the Campus Judicial Coordinator for disciplinary action. Cheating includes copying another student's work, allowing one's work to be copied, copying another team's SPICE program, looking on another person's exam sheet, using unauthorized notes, etc. Please don't jeopardize your future by CHEATING!!

4. Students are encouraged to call or consult with Dr. Szeto during his regular office hours, TuTh 1:30-3 PM in E410. Other times can be by prior arrangement.

5. Homework solutions and course grade sheet will be posted in the glass case just outside of E406. Please consult with these materials as needed.
GRADING POLICY

HOMEWORK & ATTENDANCE. Key study problems will be regularly assigned and solutions posted in the glass case outside of my office. Students should faithfully attend class and do all the assigned problems if they want to pass this very demanding course! Collaboration is OK but not plain copying of someone else’s work.

QUIZZES (8%). Several surprise quizzes based on the relevant homework problems or assigned reading will be given on the day that a homework assignment is due.

SPICE DESIGN REPORTS (37%). Four written reports of your integrated circuit amplifier design will be required in this course. A penalty of 10% per day will apply to design reports submitted late. Design reports must be typed and placed in a folder with names of all the team members on the cover page. Additional details will be forthcoming.

ORAL PROGRESS REPORT (5%). On the day that a progress report is due, one of the team members will give a formal 5-7 minute oral presentation of their team’s design strategy and accomplishments.

MIDTERM (20%). Around the 8-9th week of the semester, there will be a non-comprehensive examination based on the study problems and the design project completed up to that time.

FINAL EXAMINATION (30%). A two hour comprehensive examination will be given as per the schedule of classes. See date and time below.

FINAL COURSE GRADES will be determined using the above weighing factors. For quizzes, the midterm, and final, T-scores will be used. T-scores reflect a student's performance on a graded item in relation to the whole class by combining the class average (X) and the standard deviation for that graded item (S) with the student's own grade (x) using the following formula:

\[
T\text{-score} = \frac{(x - X)}{S} \times 10 + 50
\]

COURSE OUTLINE

Chap 1 - Models of Integrated Circuit Active Devices. [2 lectures]
Chap 3 - Single and Two Transistor Amplifiers. [2 lectures]
Chap 4 - Transistor Current Sources & Active Loads. [3 lectures]
Chap 2 - Bipolar, MOS, and BiCMOS IC Technology. [2 lectures]
Chap 5 - Output Stages. [2 lectures]

MIDTERM COVERING CHAPTERS 1-5 (October 23rd, Wednesday)

Chap 6 - Operational Amplifiers. [4 lectures]
Chap 7 - Frequency Response of Integrated Circuits. [3 lectures]
Chap 8 - Feedback. [3 lectures]
Chap 9 - Frequency Response and Stability of Feedback Amplifiers. [3 lectures]
Chap 10 & 11 - Nonlinear Analog Circuits and Noise in ICs. [1-2 lectures] (as time permits)
Design Projects - Oral Reports on days that the design reports are due. [4 lectures]

FINAL EXAMINATION on Monday, Dec 16, 2002, in E423 at 3:30-5:30 PM.