Analog Electronics

Lecture Room: E2-192 TTH 4:00 – 5:45pm
Laboratory Room: E2 192
Instructor: K.L. Laws (kip@soe.ucsc.edu)
Office: BE157A (x9-1912)

Course Description
This course introduces basic passive and active analog devices required for the analysis and engineering design of modern discrete electrical circuits, both analog and digital. Students are expected to possess a working knowledge of basic electrical engineering network analysis techniques (EE101 or equiv.); linear systems theory (EE103 or equiv.) is recommended.

General coverage will include the following topics (but not necessarily in the order shown):

- Basic system theory, signals, linearity and distortion, time and frequency domain perspectives and analysis. Noise and noise models; noise as a parameter in engineering design.
- The operational amplifier; ideal and non-ideal op-amp characteristics. How to use the op-amp in engineering design.
- Junction devices including diodes, bipolar junction transistors (BJT) and field-effect transistors (FET): relevant solid-state physics, basic biasing techniques, large and small-signal analysis and design, amplifier (BJT and FET) and switching characteristics, h-parameters, basic analog circuit configurations, the Ebers Moll BJT model. We will survey fundamental field-effect types, JFET and MOSFET; enhancement and depletion modes; NMOS, PMOS and CMOS digital circuits.
- Differences between the design of discrete and integrated circuits.

References
Supplementary references will be discussed in lecture. Many of these will be industrial application notes, typically in PDF format and will be made available on our website and/or handed out in class.

Lecture Notes.

Homework
Homework will be assigned and collected during class sessions, and will generally follow a weekly sequence. Material will consist of problems from our text, supplementary and extra-credit problems. To receive full credit, your work must be well organized, readable and show evidence of thoughtful attention to the problem itself. Grading will follow as described below.

A: Complete and thoughtful solutions; numerical correctness is not the sole criterion, conceptual correctness is.
B: Thoughtful solutions displaying clear evidence of attention to each problem but some conceptual errors present.
C: Numerically correct result(s) without evidence of conceptual understanding or thoughtful solution.
D: Sloppy, incomplete or poorly presented problem set.

… to each of the above, + or - as appropriate…
Examinations
There will be one midterm exam and a comprehensive final exam.

Grading
Letter grades will be assigned for all work. Averaging will follow the usual 4.0 point scale to determine a final grade-point and associated letter grade. Category weightings are as follows:

<table>
<thead>
<tr>
<th>Category</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homework</td>
<td>30%</td>
</tr>
<tr>
<td>Midterm Exam</td>
<td>30%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>40%</td>
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</tbody>
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passing this test is required to pass the class.

Lab Reports
Reports must be turned in neatly hand written on engineering notepaper or typed (stapled loose sheets) rather than in bound engineering notebooks. Bound notebooks for notes or as an engineering journal are good practice but are optional and will not be collected. Reports are expected to clear, concise and complete, as well as neat and well organized. Lab reports should include circuit diagram sketches either neatly hand drawn or created on computer.

Academic Integrity
The student-instructor relationship is based on imputed trust. Violations of this trust by deceptively offering the work of others as your own, cheating on examinations etc. will result in formal charges of academic dishonesty being brought against you.

Students with disabilities
Accommodations will be made available for students with disabilities and I encourage any students with disabilities to meet with me. If you qualify for classroom accommodations because of a disability, please get an Accommodation Authorization from the Disability Resource Center (DRC) and submit it to me in person outside of class (e.g. office hour) within the first two weeks of the quarter. Contact DRC at 459-2089 (voice), 459-4806 (TTY). More information about the DRC is available at http://drc.ucsc.edu