Course number and name ECE 294, Analog and Digital Circuits Laboratory

Credits, contact hours 2 credits, 4 contact hours

Name(s) of instructor(s) or course coordinator(s) John Carpinelli

Instructional Materials *Laboratory Manual and Supplementary Notes: ECE 294, Analog and Digital Circuits Laboratory*

Specific course information

brief description of the content of the course (catalog description)

Laboratory work in the areas covered in ECE 231, ECE 232, and ECE 251. Assembling, testing and analysis of basic analog and digital circuits. Emphasis electronic measurement techniques, instrumentation, and data analysis. Simulations and measurements of dc, ac, and transient response of basic analog circuits. Experiments and design of digital circuits from basic gates to complex logic, including sequential circuits, the arithmetic/logic unit, and computer memories.

prerequisites ECE 231, ECE 251, ENGL 101; corequisite: ECE 232

Educational objectives for the course (e.g. The student will be able to explain the significance of current research about a particular topic.)

Students will be able to:

1. Use basic electronic instruments (DC power supply, waveform generator, multimeter, and analog and digital oscilloscopes) to analyze and debug circuits.
2. Verify experimentally basic circuits laws (Ohm's, Kirchhoff's) and explain differences between theoretical and measured values.
3. Measure amplitude and phase of sinusoidal signals on components of RC and RLC circuits.
4. Measure parameters of passive resonance circuits and filters.
5. Design and construct combinatorial circuits using discrete logic gates.
6. Design and construct sequential circuits using flip-flops.

Brief list of topics to be covered

- Combinatorial Circuits
- Sequential Circuits
- Shift Registers
- Counters
- Design Project – A Gate Function Detector
- Introduction to Basic Instruments, the Oscilloscope
- Superposition Principle and Thevenin Equivalent Circuits
- Internal Impedance of Instruments

- AC Measurements
- Input Impedance of an Oscilloscope and the Scope Probe
- The Diode and Diode Circuits
- The Transistor – Comparison of MOS and Bipolar