Course Syllabus

ECE 2B  
*Circuits, Devices, and Systems*  
4 units  
*(Required)*

**Catalog Description:**
Second order circuits. Laplace transform and solution of steady state and transient circuit problems in the s-domain; Bode plots; Fourier series and transforms; filters. Transistor as a switch; load lines; simple logic gates; latches and flip-flops.

**Prerequisites:**
ECE 2A with a grade of C- or better; open to electrical engineering, computer engineering, and pre-computer engineering majors only.

**Text, References, and Software:**


**Topics Covered and Course Goals:**

1. **Diodes and Diode Circuits**
   a. Diode and LED I-V characteristics and Load-line analysis
   b. Approximate DC modeling (constant voltage drop model)
   c. DC circuit calculations
   d. Basic diode circuit applications (rectifiers, limiters, doublers)

2. **Laplace Transform Methods**
   a. 1st and 2nd-order circuit responses (time-constants, under/over/critical damping)
   b. Basic properties of Laplace transforms
   c. Circuit elements in the s-domain and initial conditions
   d. s-domain transfer functions
   e. Partial fraction expansions, special cases (repeated roots, complex poles)
   f. Initial/Final value theorems
   g. Finding time-domain responses of circuits use LT methods

3. **Transistors (DC biasing and Switching)**
   a. Basics of FETs and BJTs, I-V characteristics
   b. Approximate DC models
   c. DC circuit calculations, load-line analysis
d. Common DC biasing circuits (diode-connected transistor, four-resistor network)
e. Use of the transistor as a switch, logic gates
f. Analysis of switching circuits in the s-domain

4. **Frequency Response and Filters**
   a. Finding the frequency response from the s-domain transfer function
   b. Bode-plots, magnitude and phase, complex poles
   c. Basic filter building blocks (1st and 2nd-order low/high/bandpass)
   d. Series/Parallel Resonators – resonant frequency, Q, bandwidth
   e. Active filters, use of unit-gain buffers for cascading circuits

**Class/Laboratory Hours:**
Lecture, 3 hours; Laboratory, 3 hours.

**Contribution to Criterion 5**
Contributes to the one and one-half year of engineering topics, primarily engineering sciences.

**Contribution to Program Outcomes:**

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Prepared by: Bob York Date: March 2008