College of San Mateo
Official Course Outline

1. **COURSE ID:** ENGR 260 **TITLE:** Circuits and Devices
   Units: 4.0 units **Hours/Semester:** 48.0-54.0 Lecture hours; 48.0-54.0 Lab hours; and 96.0-108.0 Homework hours
   Method of Grading: Letter Grade Only
   Prerequisite: PHYS 260, Completion of or concurrent enrollment in Math 275.

2. **COURSE DESIGNATION:**
   Degree Credit
   Transfer credit: CSU; UC

3. **COURSE DESCRIPTIONS:**
   Catalog Description:
   Introduction to circuits. Natural and forced response, network theorems, characteristics and circuit models of electronic devices including transistors and diodes. Laboratory assignments include both hardware techniques and computer-aided analysis. (Spring only)

4. **STUDENT LEARNING OUTCOME(S) (SLO'S):**
   Upon successful completion of this course, a student will meet the following outcomes:
   1. Use appropriate techniques to find current, voltage, resistance, power, and energy in DC circuits.
   2. Use Thevenin and Norton equivalent circuits to assist in analysis and design.
   3. Analyze first and second order RLC circuits for natural and forced response.
   4. Analyze circuits containing solid state devices, including diodes, transistors (optional), and operational amplifiers.
   5. Design DC and AC circuits to meet specific performance objectives.
   6. Use standard lab equipment and techniques to build and test DC and AC circuits.
   7. Use standard software to simulate circuits for design and testing.
   8. Record and document the results of laboratory work using appropriate text and graphs.

5. **SPECIFIC INSTRUCTIONAL OBJECTIVES:**
   Upon successful completion of this course, a student will be able to:
   1. Use appropriate techniques to find current, voltage, resistance, power, and energy in DC circuits.
   2. Use Thevenin and Norton equivalent circuits to assist in analysis and design.
   3. Analyze first and second order RLC circuits for natural and forced response.
   4. Analyze circuits containing solid state devices, including diodes, transistors (optional), and operational amplifiers.
   5. Design DC and AC circuits to meet specific performance objectives.
   6. Use standard lab equipment and techniques to build and test DC and AC circuits.
   7. Use standard software to simulate circuits for design and testing.
   8. Record and document the results of laboratory work using appropriate text and graphs.

6. **COURSE CONTENT:**
   Lecture Content:
   1. Review of circuit elements, Ohm's law, KVL, KCL, voltage and current dividers
   2. Analysis of circuits using nodal and loop methods and Thevenin and Norton equivalents
   3. Superposition
   4. Steady state dc analysis
   5. Transient analysis of RL, RC circuits
   6. Transient and steady state analysis of second order circuits
   7. Phasors and complex impedance
   8. Frequency response of 1st and 2nd order AC circuits
   9. Resonance
   10. AC power, power transfer, power factor
   11. Analysis and design of circuits containing operational amplifiers (ideal model; gain and current limitations of real op amp circuits)
   12. (optional) Analysis and design of circuits containing transistors
   13. (optional) Three phase power

Lab Content:

Laboratory experiments and exercises verify, reinforce, and extend concepts covered in lecture. Labs include design, construction, and testing of physical circuits and the simulation of circuits using standard software (e.g., PSPICE or Electronics Workbench). Laboratory skills and techniques include safety, use of standard test and measurement equipment, component labelling, circuit construction.

7. **REPRESENTATIVE METHODS OF INSTRUCTION:**

Typical methods of instruction may include:

A. Lecture
B. Lab
C. Experiments
D. Other (Specify): Lectures to introduce new material and topics. Textbook reading assignments to expand knowledge. Individual take-home problems to develop skills. Laboratory experiments and exercises to reinforce and extend concepts covered in lecture.

8. **REPRESENTATIVE ASSIGNMENTS**

Representative assignments in this course may include, but are not limited to the following:

Writing Assignments:

Lab reports describing purpose of lab, supporting theory/analysis, experimental set-up, procedure, results, analysis, conclusions.

Reading Assignments:

Weekly reading assignments in textbook.

Other Outside Assignments:

Weekly problem-solving assignments. Pre-lab and post-lab analysis (typically weekly). Design and analysis in support of (optional) individual/group project.

To be Arranged Assignments:

N/A

9. **REPRESENTATIVE METHODS OF EVALUATION**

Representative methods of evaluation may include:

A. Exams/Tests
B. Homework
C. Lab Activities
D. Projects
E. Individual problem-solving assignments. Group problem-solving assignments (optional). Individual problem-solving exams. Individual or group laboratory reports. Individual or group design projects (optional). Individual or group laboratory exams (optional).

10. **REPRESENTATIVE TEXT(S):**

Possible textbooks include:

A. Alexander, C. and M. Sadiku. *Fundamentals of Electric Circuits*, 6th ed. McGraw Hill, 2016
B. Nilsson, J.W. and S. Riedel. *Electrical Circuits*, 10th ed. Pearson, 2015
C. Hambley, A. R.. *Electrical Engineering Principles and Applications*, 6th ed. Pearson, 2014
D. Svoboda, J.A. and R.C. Dorf. *Introduction to Electric Circuits*, 9th ed. Wiley, 2014

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Course Originator: Laura Demsetz