ELEN 2310 Fundamentals of Electrical Engineering  
(Taught previously as ELEN 4304 Special Topics course pending approval by the Texas Higher Education Coordinating Board)  
(Required for CHEN, MEEN, INEN)

Catalog Description: For non-EE majors, this course covers the three areas of circuits, electronics and power. Topics include dc and ac circuit analysis; electronics components and circuits; and power calculations for dc, ac single and three-phase loads, and electric machines.

Prerequisite:
By course: MATH 2414 Calculus & Analytic Geometry II, PHYS 2426 Calculus Based Physics II, and ELEN 1301 Introduction to Computers and Programming with grade of C or better.
By topic: KCL, KVL, basic DC and AC circuit analysis.

Courses that require this as a prerequisite:

Credits: 3

Offered: Fall, Spring, and Summer Annually

Instructors:
Primary: Wendell Bean
Secondary: Gleb Tcheslavski (gleb@ee.lamar.edu)

Online access: class materials will be available at http://www.ee.lamar.edu/gleb/iee/Index.htm


References: None

Objectives (with corresponding ABET Criteria/outcomes):
Ensure students:
- Understand the basic concepts of Ohm's law and Kirchhoff's loop voltage and node current laws. (Criterion 3(a))
- Understand DC and AC circuit analysis for multiple sources, both independent and dependent sources. (Criterion 3(a))
- Know how to develop Thevenin and Norton equivalent circuits and use in varying load calculations. (Criterion 3(a),(e))
- Can perform steady-state sinusoidal analysis of linear lumped-parameter circuits. (Criterion 3(a),(e))
- Understand basic physics and operation of diodes, BJTs and MOSFETs. (Criterion 3(a))
- Understand the concepts of DC and small-signal analysis. (Criterion 3(a))
- Understand the analysis of basic amplifier configurations. (Criterion 3(a),(c))
- Understand the ideal op-amp and various op-amp applications. (Criterion 3(a),(c))
- Can calculate electric power or single-phase AC loads and use of power factor for inductive and capacitive loads. (Criterion 3(a))
- Can calculate power for balanced three-phase loads, in both wye and delta configurations. (Criterion 3(a))
• Understand basic transformer models including voltage and current relations to turns ratio, and reflected impedance calculations. Criterion 3(a))

Topics (approximate number of lecture hours):
• Voltage, current, power, Ohm's law. (1 ½ hours)
• Kirchhoff's laws for loop/mesh voltages and node currents with simple circuits. (1 ½ hours)
• Equivalent resistance used with voltage and current division principles. (1 ½ hours)
• Nodal analysis and supernodes. (1 ½ hours)
• Mesh analysis and supermeshes. (1 ½ hours)
• Thevenin/Norton equivalent circuits; maximum power to load. (1 hours)
• Source-free RL and RC circuits, time constants. (1 hours)
• Driven RL and RC circuits. (1 hours)
• Parallel RLC circuits. (1 ½ hours)
• Series RLC circuits. (1 ½ hours)
• Sinusoidal voltages, currents, phasors. (1 ½ hours)
• Impedance and admittance. (1 hour)
• Sinusoidal steady-state analysis methods. (3 hours)
• Diodes: physics, Zener diode circuits. (3 hours)
• Diode rectifier circuits for half-wave and full-wave rectification. (1 hour)
• Amplifier basics; cascaded amplifiers. (1 ½ hours)
• BJT physics, single-stage amplifiers, load line analysis. (3 hours)
• MOSFET physics, single-stage amplifiers, load line analysis. (3 hours)
• The Ideal Operational amplifier, Op-Amp circuits. (3 hours)
• Single-phase AC power, power factor. (1 ½ hours)
• Three-phase power for delta and wye connections. (1 ½ hours)
• Ideal transformer models, reflected impedance. (1 ½ hours)

Structure: Five 90-minute lectures per week. No labs. Two 90-minute exams and a two hour final. All tests are closed books/notes, no communication. Frequent homework assignments.

Policy: Homework is due the second class after it has been assigned. No late homework will be accepted. It is your responsibility to know all exam dates. No make-up exams will be given in this class except for written medical excuse. Class attendance is mandatory with the exception for medical and family emergencies. Students are required to notify instructor of their absence in advance.

Contribution to professional component:
  Math and basic science    0.0 (units)
  Engineering Topics        3.0 (units)
  Does this course contain significant design experience? Yes

Prepared by: Dr. Wendell Bean
Modified by: Dr. Gleb Tcheslavski

May 2006
May 2009