The University of Texas Rio Grande Valley

College of Engineering and Computer Science
CMPE 2320 / ELEE 2305 – ELECTRIC CIRCUITS I
Course Syllabus – Fall 2016 Semester

Objectives To learn basic principles of electric circuits, including (a) fundamental definitions and conventions, (b) fundamental laws governing electric circuits, (c) analysis techniques for DC circuits, including node-voltage, loop-current, source transformation, superposition, and Thevenin and Norton equivalents, (d) ideal operational amplifiers as circuit elements, (e) inductance, capacitance, and mutual inductance, (f) analysis of simple transient circuits, (g) analysis of sinusoidal steady state circuits, and (h) power in sinusoidal steady state circuits.

Schedule T R 3:05-4:20 pm at ENGR 1.272

Office Hour: T R 1:00 – 3:00pm
W 1:00 – 2:00pm (By Appointment Only)

Text *Fundamentals of Electric Circuits,* by Charles K. Alexander and Matthew N.O. Sadiku. McGraw-Hill. I will use 5th Edition.

Instructor Dr. Nazmul Islam, Associate Professor
Electrical Engineering;
E-mail: Nazmul.islam@utrgv.edu
Office: Engineering Bldg, **ENGR 3.277**.
Phone: 956-665-7228 (W)

Prerequisites Completion of Calculus II (MATH 1470 or equivalent) with a grade of C or better. PHYS 2402 is a corequisite.

Requirements (1) Homework, (2) Quizzes, (3) Simulations, (4) Examinations, and (5) Course Portfolios

Homework: Approximately one homework per week. Students are allowed and encouraged to discuss homework assignments and work together. However, the material you turn in should be your own work in your own writing. I will grade one problem & check that you attempt all problems.

Quizzes: There will be approximately one 15-minute quiz per week. Expect a quiz every Thursday unless otherwise announced.

Simulation Projects: Couple of projects during the semester using PSpice software. You should discuss your ideas with other students but *you must enter your own PSpice schematics*. Assignments will be individualized.

Examinations: Two midterms and a final. If you cannot make the specified exam time, please notify the instructor *before* the exam to make alternate arrangements.

Grading:

Homework/Class Participation/Simulations	15
Quizzes	20
Midterm1	20
Midterm2	20
Final Exam	25

Letter grade for this course will be assigned according to the following scale:

A	***B***	***C***	***D***	***F***
>= 90	80 - 89	70 - 79	60 - 69	< 60

The possible grades are A, B, C, and F.

Items Needed

(1) You will need a calculator capable of working with complex numbers quickly and efficiently. Matrix solving capability is also useful. A good low cost calculator for complex numbers is the Casio FX-115. Any of the TI-8X or TI-9X series calculators are also a good choice.

(2) The PSpice software used in this course is loaded in computer labs on the first and second floor of this building. In order to log in to these computers you will need a valid, active UTRGV e-mail account. The demo and student versions of PSpice available for download are sufficient for this course.

Requests

(1) Please do not hand me papers at random times and. Homework can be turned in (a) in the mailboxes hanging on the wall outside my office, or (b) Submit it in class.

(2) Please don't staple different assignments together.

List of Topics Subject to change as the semester progresses.

1. Basic Concepts (**Chapter 1**)
2. Basic Laws (**Chapter 2**) Sections 2.1-2.7
3. DC Circuits/Analysis:
    a. Analysis Methods (**Chapter 3**) Sections 3.1-3-8
    b. Circuit Theorems (**Chapter 4**) Sections 4.1-4.8
    c. Power and Energy (**Chapter 1**) Section 1..5
    d. Capacitors and Inductors (**Chapter 6**) Sections 6.1-6.5
    e. First-Order Circuits (**Chapter 7**) Sections 7.1-7.6
4. AC Analysis:
    a. Sinusoids and Phasors (**Chapter 9**) Sections 9.1-9.7
    b. Steady-State Analysis (**Chapter 10**) Sections 10.1-10.6
5. AC Power Analysis:
    a. (**Chapter 11**) Sections 11.1-11.6
6. Operational Amplifiers:
    a. (**Chapter 5**) Sections 5.1-5.7
    b. Op-Amp AC Circuits (**Chapter 10**) Section 10.

Outcomes At the end of the semester, it is expected that students should be able to:

(1) understand the concepts of voltage and current, the passive sign convention, and demonstrate the ability to properly add and subtract voltages and currents as appropriate in a circuit,
(2) state and apply Kirchoff's voltage and current laws, including cases where portions of the circuit are implicit rather than explicit.
(3) understand Ohm's law, recognize and simplify any combination of resistances to find an equivalent resistance,
(4) analyze circuits of substantial complexity using nodal analysis,
(5) analyze circuits of substantial complexity using mesh analysis,
(6) apply source transformations to simplify circuits
(7) understand the principle of superposition, find the voltage and current due to individual sources in a multiple source circuit
(8) analyze circuits containing ideal operational amplifiers and design simple amplifier circuits using operational amplifiers
(9) understand basic circuit relationships for inductors and capacitors, find voltage given current and vice versa
(10) recognize first order transient circuits including distinguishing them from other types of transient circuits, find initial and final values, analyze first order circuits and find time domain response.
(11) recognize and perform basic calculations on second order circuits.

(12) represent sinusoids by phasors, combine and manipulate phasor quantities
(13) understand impedance and admittance, find equivalent impedance and admittance for circuits of substantial complexity
(14) transform a circuit into the phasor domain, and apply circuit analysis techniques including nodal, mesh, superposition; find phasor Thevenin and Norton equivalents
(15) compute power in AC circuits, including instantaneous, peak, average, reactive, and apparent power, compute power factor.
(16) use circuit simulation software to analyze DC, transient, and AC circuits.

Relationship to Program Outcomes

This course contributes to achieving the following student learning outcomes for the BSEE program:

1. ability to use knowledge of mathematics, basic science, and engineering to analyze (identify, formulate, and solve) problems in electrical engineering.

8. ability to use state of the art computational hardware and software for analysis, design, and documentation.

B. an understanding of electrical circuits and electronics, and analysis, synthesis, and experimental techniques for both analog and digital electronic circuits.

B1. familiarity with linear circuit theory and analysis techniques in both the time and frequency domains

Instructor Evaluation will be done at the end of the semester using the standard UTRGV evaluation procedures.

ADA Notice: If you have any disability which will make it difficult for you to carry out the work as I have outlined and/or if you need special accommodations/assistance due to a disability please contact the Office of Services for Persons with Disabilities, Emilia Hall Room 100 immediately. Appropriate arrangements/accommodations can be arranged.