Fall 9-1-2016

EELE 201.01: Circuits I for Engineering

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Department of Physics and Astronomy
Course Syllabus

Circuits I for Engineering - 74903 - EELE 201 – 01
Credits: 4
Prerequisite: PHSX 217N and EGEN 101
Term: Autumn 2016

Meetings

Lectures: MWF 3:00pm – 3:50pm in Liberal Arts 105
Labs: W 4:00pm – 5:50pm in Charles H Clapp Building 012

Final Exam

Wednesday, December 14, 1:10pm – 3:10pm, in Liberal Arts 105

Faculty Contact

Steve Shen – steve.shen@umontana.edu
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Office Hours: Mondays, Wednesdays & Fridays: 12:00PM to 1:00PM
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Course Description

Circuits I for Engineering - 74903 - EELE 201 – 01
Associated Term: Autumn Semester 2016
Levels: Undergraduate
4.0 Credits
Prereq., PHSX 217N and EGEN 101.
Introduction to circuit analysis; Ohm's and Kirchhoff's Laws; resistors, capacitors, inductors, dependent sources, ideal op-amps; the complete response of first order circuits; complex frequency and phasors; steady-state AC circuits, coupled inductors and ideal transformers.
4.0 Credit hours
4.0 Lecture hours

Course Overview

In the modern era of engineering, electrical and electronic circuits are heavily involved in just about every field of science and engineering, as well as in our daily lives. The courses of Circuits I & II for Engineering introduce fundamental and essential theories and applications along with practical skills of circuit analysis and design.

The topics of Circuits I for Engineering include, but are not limited to, basic concepts and laws, nodal and mesh analysis methods, circuit theorems, operational amplifiers, capacitors and inductors, first-order and second-order circuits, sinusoids and phasors, and sinusoidal steady-state analysis.

The course is built for the students to master fundamental knowledge and hands-on skills in circuit analysis, design, implementation, and trouble-shooting by physical components and software simulations. There is a significant lab component to accompany the theory. Simulation software, such as Multisim, PSpice, and MATLAB are introduced throughout the course.

Course Objectives

Upon completion of this course students will be able to:

- Describe system units and physical quantities of linear circuits.
- Explain the basic laws of circuits.
- Understand basic concepts of DC and AC circuit behavior.
- Describe and analyze capacitor and inductor circuits.
- Develop and solve mathematical representations for simple RLC circuits.
- Understand the use of circuit analysis theorems and methods.
- Analyze small RLC circuits by hand.
- Use network techniques, like node analysis and loop analysis, to write equations for large linear circuits.
- Apply Thevenin's and Norton's theorems to analyze and design for maximum power transfer.
- Apply the concept of linearity and the associated technique of superposition to circuits and networks.
- Analyze circuits containing ideal operational amplifiers.
- Describe and analyze basic operational amplifiers.
- Explain the concept of steady state.
- Understand and analyze first-order and second-order circuits.
- Understand and explain sinusoids and phasors.
- Apply phasor analysis to AC circuits in sinusoidal steady state.
- Describe the difference between linear and non-linear circuits.
- Design, analyze, implement, and trouble-shoot basic electric and electronic circuits using both physical components and simulation software, such as Multisim, PSpice, or MATLAB.

Required Materials

Fundamentals of Electric Circuits
6th Edition, McGraw-Hill
By Charles Alexander and Matthew Sadiku
Copyright: 2017
Publication Date: January 13, 2016
ISBN10: 0078028221
ISBN13: 9780078028229

Scientific Calculator (recommend T1 84-Titanium, TI 86, or TI 89)

Multisim circuit simulation software: Here is a link for its purchase and download.
http://www.studica.com/us/en/National-Instruments/multisimstudentedition.html

Evaluation Procedures

Grades will be assessed as follows

Assessment Area:	
Homework Assignments	20%
Midterm Exam	25%
Final Exam	30%
Lab Exercises	25%

Grading Scale:

90-100%	A
80-89%	B
70-79%	C
60-69%	D
Below 60%	F

Topic Outline of EELE 201 Circuits I for Engineering

1. Basic Concepts
2. Basic Laws

3. Methods of Analysis
4. Circuit Theorems
5. Operational Amplifiers
6. Capacitors and Inductors
7. First-Order Circuits
8. Second-Order Circuits
9. Sinusoids and Phasors
10. Sinusoidal Steady-State Analysis

General Requirements for the Course

1. All the assigned lab experiments and projects are to be done **with physical components**, unless otherwise indicated by the instructor.
2. Multisim, PSpice, or MATLAB simulations are required for some of the lab exercises.
3. Please **demonstrate every lab experiment and project** to the instructor as soon as you complete them.
4. Late work may be accepted at most one week after the due date and can receive a maximum of **80%** of the full credit.
5. No work will be accepted **one week after the due date**, or after the solutions have been gone through.
6. No work will be accepted after the final week of the semester.

Academic Integrity:

All students must practice academic honesty. Academic misconduct is subject to an academic penalty by the course instructor and/or a disciplinary sanction by the University. All students need to be familiar with the Student Conduct Code. The Code is available for review online at:
http://life.umt.edu/vpsa/student_conduct.php

Using the Web to research materials and concepts is an integral part of learning in the twenty-first century. Studying with other students is a productive method of learning. A certain amount of collaborating on concepts with other students and using resources found on the Internet in an assignment is recommended. Copy and paste is not acceptable. It is expected that each student will input his/her assignment into the computer, and each student must be able to explain any assignment turned in. Collaboration on exams is strictly forbidden.

Dropping and Adding Courses or Changing Sections, Grading or Credit Status

University Policy for dropping courses or requesting grading/credit status changes can be found in the catalog:
http://www.umt.edu/withdrawal/Withdrawal%20Policies.aspx

Students should become familiar with all academic policies.

For Complete Academic Policies Please View the Um Catalog at:
http://www.umt.edu/catalog/academics/academic-policy-procedure.php

Disability Accommodations:

Eligible students with disabilities will receive appropriate accommodations in this course when requested in a timely way. Please contact me after class or in my office. Please be prepared to provide a letter from your DSS Coordinator. For more information, visit the Disability Services website at http://www.umt.edu/dss . Or call 406.243.2243 (voice/text).

Changes to Syllabi:

NOTE: Instructor reserve the right to modify syllabi and assignments as needed based on faculty, student, and/or environmental circumstances. If changes are made to the syllabus, amended copies will be dated and made available to the class.

Cell Phone and other Electronic Communication Devices Policy:

All electronic communication devices must be tuned off and stowed away prior to the start of class.

Attendance Policy:

Regular classroom attendance is expected.

Exam, Project, and Assignment Policy:

All exams are to be taken on the assigned date and time. Projects and assignments are due at the start of class on the assigned date and time. Late assignments will be accepted at the instructor's discretion. Rescheduling of an exam will be approved at the discretion of the instructor and only in extraordinary situations.

Learning Management System:

It is the responsibility of the student to access and familiarize herself/himself with the Learning Management System (LMS) for the course (Moodle). Access & training is available through UMOnline http://umonline.umt.edu