Syllabus ECE 3330
Fall 2015

No: 10264
Title: Electrical Circuits 2
Credits: 4 Lecture

WSU Catalog Description:

Coordinator: James Lenn, Adjunct Instructor, Electrical and Computer Engineering

Instructor: Mr. James Lenn, Adjunct Instructor, Electrical and Computer Engineering
Office Hours: By appointment
Office Location: 3155 Engineering
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Course Meeting Time: Tuesdays & Thursdays 10:40AM to 12:30PM
Course Meeting Location: 431 State Hall

Goals: To develop competence in the analysis of electrical circuits and gain limited design experience with relatively simple electrical circuits.

Learning Objectives: At the end of this course, students will be able to:

1. For AC steady state conditions, explain and analyze the voltage / current relationships, impedance (resistance and reactance), and operational characteristics of resistors, inductors, capacitors, ideal switches, operational amplifiers, transformers, and voltage and current sources in terms of phasors.
2. For AC steady state conditions explain and analyze different electrical circuit morphologies. In particular; series and parallel circuit structures, equivalent circuit configurations arrived at by the combination of series and parallel circuit elements such as resistors, inductors, capacitors, current and voltage sources, equivalent circuit configurations arrived at using network theorems such as; Thevenin and Norton equivalent circuits, superposition, source transformations.
3. Explain and analyze power and energy dissipation and distribution for AC steady state circuits composed of the elements listed in the first objective. This will include complex power, RMS, reactive power, maximum power transfer, superposition, and 3-phase power systems with Y and Delta source and load configurations.
4. Analyze electrical circuits using Ohm’s law and Kirchoff’s Voltage and Current laws, for AC steady state conditions, using phasors and complex frequency.
5. Perform an input/output analysis using network functions in both the phasor and complex frequency domain.
6. Analyze an electrical circuits performance in the frequency domain using Network functions and Bode Plots.
7. Analyze a signal’s frequency content using Fourier series trigonometric and exponential representations.
8. Analyze an electrical circuit’s filtering properties.
9. Analyze the complete response, transient and forced, for electrical circuits using Ohm’s law and Kirchoff’s Voltage and Current laws for a variety of sources using Laplace Transform techniques.
10. Design simple electrical circuits that exhibit a specified behavior in both the time and frequency domain.
11. Use computer modeling and simulation techniques for analysis and design.
12. Use Altium Designer, Schematic Capture and Simulation tools, to design and analyze simple circuits.

**Textbook:** Introduction to Electric Circuits, R. Dorf and J Svoboda, 9th Edition
Chapters 10-17

**Reference Texts:** none

**Prerequisites by Topic:** ECE 3300, ECE 3310, MAT 2150 (Differential Equations & Matrix Algebra)

**Corequisites by Topic:** Not Applicable

**Course Structure:** See the Class Schedule

**Computer Resources:** Altium Designer and MathCad. Student versions of these programs will be installed on student’s laptops. These programs are also available on the PCs in the College’s PC laboratory, Rooms 2351 and 2359, Engineering Building. The PC lab’s hours are posted in front of the lab. Students will use their lap tops and these programs at every class meeting.

**Laboratory Resources:** Not Applicable

**Laboratory Policy:** Not Applicable

**Distribution of Points:**

**Assignments (10% of the total grade):** The class is broken down into a collection of Instructional Modules. The Instructional Module contain: lecture notes, a Mathcad version of the lecture notes, a video covering the lecture note material, problem assignments, Altium designer project folders (as necessary) and Homework. Using Blackboard I can monitor access to these resources, time accessed and duration. Homework will be collected and checked randomly. The Homework will be graded as submitted and adequate (1) or submitted and
inadequate (no serious attempt at solving problems or working on the assignment) (0.3) and no submission (0).

**Quizzes (25% of the total grade):** Each Thursday class will end with a 25 Minute quiz period. There may be other unannounced quizzes at any time during the class period.

**Exams (35% of the total grade):** Three exams are scheduled.

**Final Exam (20% of the total grade):** A comprehensive final exam.

**Attendance (10% of the total grade):** Participation in the class is expected and mandatory. You are expected to attend every class session in its entirety. Attendance is recorded and will be used in determining your grade. Students arriving more than 15 minutes late will receive half the attendance points for the day.

**Special Assignments:** There may be one or more extra-credit special assignments during the course period. These will typically be group oriented projects, and could include: Design projects, circuit analysis and presentation projects, special assignments may require the student teams to make a presentation to the class.

**Grading Scale:**
The course grade will be based on the cumulative point a score. A cumulative score percentage will be determined by dividing each student’s cumulative score by the maximum number of obtainable points. The resulting percentage score will be used to assign a grade.

- A percentage score in the range: 100-93 -------- A
- A percentage score in the range: 92-90 -------- A-
- A percentage score in the range: 89-87 -------- B+
- A percentage score in the range: 86-83 -------- B
- A percentage score in the range: 82-80 -------- B-
- A percentage score in the range: 79-77 -------- C+
- A percentage score in the range: 76-73-------- C
- A percentage score in the range: 72-70-------- C-
- A percentage score in the range: 69-67-------- D+
- A percentage score in the range: 66-63-------- D
- A percentage score in the range: 62-60-------- D-
- A percentage score in the range: 59-0-------- F

**Attendance:** For each unexcused absence, two (2) points will be deducted from your final cumulative point score.

**Time Commitment:** In addition to regular class attendance, it is expected that 10 to 15 hours per week, outside of class will be spent by each student for required reading, homework assignments, projects, and studying.
Makeup Exam and Makeup Assignment Policy: Quizzes, assignments, and examinations may be made up if prior notification and instructor approval is provided. If there is an unauthorized missed assignment, quiz or exam a suitable, verifiable reason, e.g., medical, work, childcare, needs to be provided and permission obtained from the instructor to take a make up quiz, exam, or assignment. All make up quizzes, exams, and assignments must be made up within a reasonable period of time, typically one week.

Outcome Coverage:
(a) An ability to apply math, science and engineering knowledge. The course homework, special assignments, quizzes and exams require direct application of mathematical, scientific, and engineering knowledge to successfully complete the course. This requires performing various linear circuit analysis methods in a formal manner and many supporting and follow-up calculations.

(b) An ability to design and conduct experiments, as well as to analyze and interpret data. Students conduct simple circuit simulations using Altium Designer circuit simulation software. Students also use Mathcad and possibly Matlab to analyze and solve circuit problems.

(c) An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability. This outcome is a minor component of the course, but nevertheless present. Students will be required to design simple circuits that conform to specific functional specifications.

(e) Identify, formulate and solve engineering problems. The course is primarily oriented toward electrical circuit analysis but also includes examples of where linear circuit theory can be applied to other physical domains to model system performance. Students must be able to identify the system, formulate a circuit model, and solve the circuit model to determine circuit variables, primarily with electrical circuits.

(h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context. Students taking the course will realize the broad applicability of linear circuit analysis methods to electrical and other physical domains. Social and economic impacts will be addressed in the lectures. For example, power distribution and generation issues will be raised while covering the 3-Phase material, the extensive use of filters in a variety of devices will be addressed, FCC regulations and spectral allocation will be discussed while covering Fourier analysis.

(k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice. Students will use computer simulation and modeling software as well as computational and analysis software, i.e., Altium Designer, Mathcad and/or Matlab. Students will be required to use web based resources for component selection and additional reference materials.

Cheating Policy and Penalty for Cheating:
Cheating will not be tolerated. If students are caught cheating they will receive an F for the class. Students will neither provide nor receive assistance on quizzes or examinations. Special assignments will be designated either an individual or team assignment. As an individual assignment students must do the work independently.

Plagiarism is a form of cheating. According to WSU rules and regulations it is grounds for dismissal from school. Anyone caught cheating on assignments, quizzes or engaging in plagiarism will receive an F for this class and could be subject to further disciplinary action. It is assumed you understand what plagiarism means. If you do not then see the following definition and resources.

>“Plagiarism is using others’ ideas and words without clearly acknowledging the source of that information.” *From What is Plagiarism and how to recognize and avoid it.*
http://www.indiana.edu/~wts/pamphlets/plagiarism.shtml

**Respect:**

An atmosphere of respect, both for instructor and fellow students, will be maintained at all times.

**Food:**

Eating is not permitted in class.

**Disability:** If you have a documented disability that requires accommodations, you will need to register with Student Disability Services for coordination of your academic accommodations. The Student Disability Services (SDS) office is located at 1600 David Adamany Undergraduate Library in the Student Academic Success Services department. SDS telephone number is 313-577-1851 or 313-577-3365 (TDD only). Once you have your accommodations in place, I will be glad to meet with you privately during my office hours to discuss your special needs. Student Disability Services’ mission is to assist the university in creating an accessible community where students with disabilities have an equal opportunity to fully participate in their educational experience at Wayne State University.

Please refer to the SDS website for further information about students with disabilities and the services we provide for faculty and students: http://studentdisability.wayne.edu/