

WEST VIRGINIA UNIVERSITY

Lane Department of Computer Science & Electrical Engineering

EE 223 Electrical Circuits
Spring 2015
3 Lecture Credit Hours

Instructor: Dr. Sarika Khushalani Solanki
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Office Hours: Scheduled: TR 03:15 - 04:15 PM or by appointment.

Class Time: TR 02:00 - 03:15 PM Class Location: ESB – G83

Prerequisites: EE 221, EE 222, MATH 251 and PHYS 112.

Co-requisite: Electrical Circuits Laboratory (EE 224). If you drop EE 223 you must also drop EE 224.

Required Text: Charles K. Alexander and Matthew N.O. Sadiku
Fundamentals of Electric Circuits, Fifth Edition, McGraw-Hill, 2013 ISBN – 9780073380575

Ref: William H. Hayt, Jr., Jack E. Kemmerly and Steven M. Durbin
Engineering Circuit Analysis, Eighth Edition, McGraw-Hill, 2012 ISBN – 9780073529578

Course website: ECampus (http://ecampus.wvu.edu). Instructor is not responsible for lack of access to the website. Please DO NOT wait to the last minute to download course materials. You are responsible for material posted on this web page, so check several times a week, at least. Time critical material may be sent to your MIX e-mail account so you should check this daily.

Software: You may be required to submit assignments using MATLAB Programming as well as industry leading software such as PSpice.

- Outcomes: Students will be able to
• Find the natural and the step response of RLC circuits,
• Find the steady-state response of RLC circuits to sinusoidal inputs,
• Perform single and balanced three-phase power calculations,
• Solve problems of magnetic coupling and transformers in linear circuits,
• Solve linear circuits using Laplace transforms.

Tentative Class Schedule

Table with 3 columns: Subject, Topics, Reading. Rows include Introduction and Basic RL and RC circuits.

	Circuit time constants, Natural and forced response, Effect of initial conditions	
RLC circuits	Characteristic equation, Definition of frequency terms, e.g., damping coefficient, resonant frequency, Over-damped, critically damped, and under-damped response Complete response (natural plus forced)	Chapter 8
Sinusoidal Steady-State Analysis of RLC Circuits	Characteristics of Sinusoids, Phasors, and Phasor relationships for RLC, Impedance, Admittance, Node and Mesh Analysis, Superposition, Circuit Theorems, Phasor Diagrams	Chapters 9 and 10
Single-phase steady-state AC power circuit analysis	Effective (RMS) values, Real and reactive power, Complex power, Power factor, Maximum power transfer	Chapter 11
Polyphase circuits	Balanced three-phase circuits, Three-phase circuits and loads, Delta and Wye configurations/conversions, Three-phase power calculations	Chapter 12
Magnetically coupled circuits	Mutual and self-inductance, Magnetic coupling, Linear coupled coils and “Dot” convention, Linear transformers/reflected impedance, Ideal transformers/impedance matching	Chapter 13
Resonance and frequency response	Parallel and series resonance, Frequency response, Bandwidth and quality factor, Bode plots	Chapter 14
Complex frequency and the Laplace transforms	Background and definitions, Step and impulse functions, Functional transform computation, Operational transforms, Inverse Laplace transform computations	Chapter 15
Circuit analysis in the Laplace-domain	Circuit analysis in the s-domain, Impulse response	Chapter 16

**Final Exam:** Regularly scheduled University final exam

**Grading Policy:**

Homework	15%
Quizzes	10%
Exam I	25%
Exam II	25%
Final Exam	<u>25%</u> (Comprehensive)
	100%

**Grade**

**Boundaries:** Curving will be at instructor's discretion.

A	90%	You are guaranteed at least the letter grade shown here if you obtain the corresponding score. However, at my discretion, the decision boundaries may be adjusted in your favor.
B	80%	
C	70%	
D	60%	

**Homework:**

There will be approximately 8-10 homework assignments given throughout the semester. *Homework is due at the start of class on the due date. **Late homework will not be accepted.*** You *must* practice (by doing homework problems) to be successful in this class.

**Submission Guidelines:**

Your homework should be neatly written on engineering paper or typed (in word or LaTeX) and printed. Only write on one side of the paper, and clearly label your answers by placing a box around the final answer for each part. Clearly indicate the problem number at the beginning of each problem and next to the final solution. Staple your papers with a single staple in the upper left hand corner (make sure that the problem numbers are not under the staple).

**Quizzes:**

Quizzes may be given which will cover the homework material submitted and the class material covered after the previous quiz.

**Missed Test Policy:**

You are expected to attend the quizzes, tests, and final exam at the scheduled times and dates. If you have an unavoidable conflict, please let me know as soon as possible, but no later than one week before the test (or quiz/exam). The decision to give a make-up is at my discretion. If you miss the test without first having your absence approved, then the only acceptable excuse is for documented urgent medical reasons or approval by the appropriate university official.

**Honor Code:**

All work submitted for the quizzes, test, and final exam must be your own unaided work. You may confer with your colleagues on interpretation and approach to homework problems, but the final solution must be your own work. Re-grading: If you believe that the instructor or grader made a mistake or was unfair in grading, you may request a re-grade. However, the request must be made in writing and within one week that the assignment or exam was returned.

**Attendance:**

Attendance is strongly encouraged. Attendance will be recorded at random times throughout the semester and bonus points will be awarded at the discretion of the instructor. In any case, you will be responsible for all material covered in class, even if it is not in the textbook. You are also responsible for material posted on the course webpage. It is your responsibility to make sure that all assignments are turned in on time and that you are aware of all announcements made in class. *Please arrive to class on time.*

**Social Justice Statement:**

*West Virginia University is committed to social justice. Our University does not discriminate on the basis of race, sex, age, disability, veteran status, religion, sexual orientation, color or national origin. Any suggestions as to how to further such a positive and open environment in this class will be appreciated and given serious consideration. If you are a person with a disability and anticipate needing any type of accommodation in order to participate in this class, please advise me and make appropriate arrangements with Disability Services (293-6700). If you feel that you are being treated inappropriately or unfairly in any way, please feel free to bring your concerns to my attention. Please be assured that doing so will not prejudice the grading process. In return, I expect you to behave professionally and ethically.*