The University of Texas at Tyler
Department of Electrical Engineering

Course: EENG 3305 – Linear Circuit Analysis II (Required)

Syllabus

Catalog Description:

Laplace transform; Transient Circuit Analysis; circuit analysis and design using the Laplace transform; convolution in time domain and frequency domain; transfer functions; frequency response and Bode plots; passive and active filter design (frequency selective circuits); Fourier series; Fourier Transform; two-port circuits; balanced three-phase AC circuits. Three hours of lecture per week.

Prerequisites: EENG 3304, MATH 3305, MATH 3404, COSC 1336, COSC 1136

Credits: (3 hours lecture, 0 hours laboratory per week)

Text(s): Alexander, Charles K. and Matthew N. O. Sadiku, Fundamentals of Electric Circuits, Fifth Edition, McGraw-Hill, 2013, ISBN 978-0-07-338057-5

Additional Material: Handouts

Course Coordinator: Premananda Indic

Topics Covered: (paragraph of topics separated by semicolons)

Laplace Transform; Circuit Analysis and Design using the Laplace Transform; Convolution in Time Domain; Transfer Functions; Frequency Response and Bode Plots; Passive and Active Filter Design (frequency selective circuits); Fourier Series; Fourier Transform; Balanced Three-phase AC Circuits

Evaluation Methods: (only items in dark print apply):

1. Examinations / Quizzes
2. Homework
3. Report
4. Computer Programming
5. Project
6. Presentation
7. Course Participation
8. Peer Review

Course Learning Outcomes[1]: By the end of this course students will be able to:

1. Understand how the Laplace transform is used to solve differential equations for circuit design (1)
2. Design a passive RLC filter (1)
3. Solve a frequency scaling problem in active filter design. (1)
4. Design high-order filters using op-amps. (1)
5. Describe how the Fourier Series can be used to represent periodic signals (2)
6. Demonstrate the use of convolution in time to describe an LTI system. (1)
7. Determine the impulse response and step response in linear circuit. (1)
8. Compute the Fourier Transform for aperiodic signals. (1)
9. Sketch Bode plots for single pole systems by hand. (1)

10. Use modern engineering tools including modeling and simulation software and virtual instruments. (2, 4)
11. Analyze balanced three-phase circuits. (2)
12. Analyze two-port networks. (1)

[1]Numbers in brackets refer to method(s) used to evaluate the course objective.

Relationship to Program Outcomes (only items in dark print apply)[2]: This course supports the following Electrical Engineering Program Outcomes, which state that our students will:

1. have the ability to apply knowledge of the fundamentals of mathematics, science, and engineering; [1,5,6,8]
2. have the ability to use modern engineering tools and techniques in the practice of electrical engineering; [10]
3. have the ability to analyze electrical circuits, devices, and systems; [3,9,11]
4. have the ability to design electrical circuits, devices, and systems to meet application requirements; [4]
5. have the ability to design and conduct experiments, and analyze and interpret experimental results;
6. have the ability to identify, formulate, and solve problems in the practice of electrical engineering using appropriate theoretical and experimental methods; [2,7,12]
7. have effective written, visual, and oral communication skills;
8. possess an educational background to understand the global context in which engineering is practiced, including:
   a. knowledge of contemporary issues related to science and engineering;
   b. the impact of engineering on society;
   c. the role of ethics in the practice of engineering;
9. have the ability to contribute effectively as members of multi-disciplinary engineering teams;
10. have a recognition of the need for and ability to pursue continued learning throughout their professional careers.

[2]Numbers in brackets refer to course objective(s) that address the Program Outcome.

Contribution to Meeting Professional Component: (in semester hours)

Mathematics and Basic Sciences:	0.25	hours
Engineering Sciences and Design:	2.75	hours
General Education Component:		hours

Prepared By:	Hassan El-Kishky	Date:	August 23, 2007
Updated By:	David Hoe	Date:	August 21, 2013

EENG 3305: Linear Circuits Analysis –II

Fall 2018 Syllabus

Instructor Information:

Premananda Indic, PhD
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The University of Texas at Tyler
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Office Hours:

Monday	: 12 (noon) to 1:30PM
Wednesday	: 12 (noon) to 1:30PM
Additional Hours	: By appointment

Course Description:

The objective of this course is to study the application of Laplace transform for the analysis and design of linear circuits. The course will focus on time domain as well as frequency domain analysis; convolution; transfer functions; passive and active filter design; Fourier series and Fourier Transform; two-port circuits; balanced three-phase circuits.

The primary student learning objectives are:

1. Understand how the Laplace transform is used to solve differential equations for circuit design
2. Determine the impulse response and step response in linear circuit.
3. Demonstrate the use of convolution in time to describe an LTI system.
4. Describe how the Fourier Series can be used to represent periodic signals
5. Compute the Fourier Transform for aperiodic signals
6. Sketch Bode plots
7. Design a passive RLC filter
8. Solve a frequency scaling problem in active filter design
9. Design high-order filters using op-amps
10. Use modern engineering tools including modeling and simulation software and virtual instruments
11. Analyze balanced three-phase circuits
12. Analyze two-port networks

Recommended Textbook:

Alexander, Charles K. and Matthew N. O. Sadiku, Fundamentals of Electric Circuits, Fifth Edition, McGraw-Hill, 2013, ISBN 978-0-07-338057-5

Evaluation and Grading:

The course grade will be based on the following activities:

1. **Homework Assignments (30%):**
   Homework will be assigned as mentioned in the course outline below. There will be four homework assignments and it should be submitted through blackboard using pdf or word format. No late submissions allowed. Collaboration on homework assignments is strongly encouraged, however expecting a disclaimer statement at the end of your assignments if you have discussed with the students in the class or someone outside. All resources, including materials obtained from internet should be properly acknowledged.

2. **Tests (40%):**
   There will be four tests of duration 1 hour each as given in the outline. There will be a grade replacement policy. For example, if your Test 2 grade is better than Test 1, then Test 1 grade will be replaced with the Test 2. This approach will be followed for other tests. For Test 4, you will get a score of at least an average of three previous tests. It is important that you should attend all tests and should score at least 50% to be eligible for grade replacement policy.

3. **Midterm Exam (15%):**
   There will be a midterm exam of duration 1 hour as mentioned in the outline

4. **Final Exam (15%):**
   Final exam as per University Schedule

Students are encouraged to read the academic honesty policy (Student Standards of Academic Conduct).

Course Outline:

Schedule	Topics	Assignments
Week 1: (Sept 3)	Introduction to Laplace transform Solving differential equations using Laplace transform	Review Syllabus Read Chapter 15, Page 675-697
Week 2: (September 10)	Transfer Function Impulse response and step response of a system (Time domain analysis)	
Week 3: (September 17)	Convolution	Test 1 on 9/19/16
Week 4: (September 24)	Fourier Series	HW1 due on 9/26/16
Week 5: (October 1)	Fourier Transform	Test 2 on 10/03/16 (9:00AM to 10:00AM)
Week 6: (October 8)	Frequency Domain Analysis Bode Plots	HW2 due on 10/10/16
Week 7: (October 15)	Review of topics studied in Week 1 through Week 6	
Week 8: (October 22)	Introduction to filters	Midterm on 10/24/16 (9:00AM to 10AM)
Week 9: (October 29)	Passive filter design	HW3 due on 10/31/16
Week 10: (November 5)	Active filter design	Test 3 on 11/7/16 (9:00AM to 10:00AM)
Week 11: (November 12)	Higher order filters using op-amps Modeling and simulation software	HW4 due on 11/14/16
Week 12: (November 26)	Analysis of balanced three-phase circuits	Test 4 on 11/28/16 (9:00AM to 10:00AM)
Week 13: (December 3)	Analysis of two-port networks	
Week 14: (December 10)	Final Exam	