The University of Texas at Tyler
Department of Electrical Engineering

Course: EENG3304 – Linear Circuit Analysis I (Required)

Syllabus

Catalog Description:

Basic circuit elements (resistance; inductance, mutual inductance, capacitance, independent and controlled voltage and current sources). Topology of electrical networks; Kirchhoff 's laws; node and mesh analysis; dc analysis; introduction to operational amplifiers; complex numbers; sinusoidal steady-state ac circuit analysis; first and second-order circuits; transient analysis of first-order circuits.

Prerequisites: Prerequisites EENG 1301, Co-requisites: Math 3305, PHYS 2326 PHYS2126,

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

Text(s): Fundamentals of Electric Circuits with Connect Plus, Charles Alexander, 7th Edition, McGraw Hill. ISBN: 978-1-260-22640-9

Additional Material: None

Course Coordinator: Premananda Indic, PhD

Topics Covered: (paragraph of topics separated by semicolons)

In this course the student will cover DC and AC circuit analysis techniques; Kirchoff's Laws; Thevenin and Norton transformations; transformers; DELTA to Y transformations; operational amplifiers; 1st order circuits and brief introduction to 2nd order circuits.

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

1. Examinations
2. Quizzes
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. Explain the concept of electric potential, current, and power. [1]
2. Identify concepts of electric network topology: nodes, branches, and loops. [1]
3. Describe the relationship of ideal voltage and current in resistors, capacitors and inductors. [1]
4. Describe the relationship of ideal voltage and current in mutual inductance. [1]
5. Apply Kirchhoff's Voltage Law (KVL) to analyze electric circuits. [6]
6. Apply Kirchhoff's Current Law (KCL) to analyze electric circuits. [6]
7. Explain the concept of Thevenin equivalent. [1]
8. Explain the concept of Norton equivalent. [1]

9. Apply Thevenin equivalent to circuits. [1]
10. Apply Norton equivalent to circuits. [1]
11. Analyze simple operational-amplifier circuits using an ideal op amp model. [1]
12. Describe simple transformer circuits. [1]
13. Perform transient analysis of first-order circuits. [1]
14. Apply the phasor transform to sinusoidal steady state analysis of electric circuits. [1]
15. Characterize the response of second order circuits. [1]
16. Understand the importance of electric circuits in the real world. [4]

[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. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics; [1,2,3,4,7,8,9,10,11,12,13,14,15]
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors;
3. an ability to communicate effectively with a range of audiences;
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts; [16]
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives;
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions; [5,6]
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

[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:		hours
Engineering Sciences and Design:	3	hours
General Education Component:		hours

Prepared By:	Premananda Indic	Date:	May 27, 2020
Modified By:			
Modified By			

EENG 3304: Linear Circuits Analysis –I

Spring 2022 Syllabus

Instructor Information:

Premananda Indic, PhD
Department of Electrical Engineering,
The University of Texas at Tyler,
Office: RBN 2010,
Phone: 903-566-6208,
email:pindic@uttyler.edu (preferred)

Office Hours: (By appointment and via zoom only)

Monday	: 11:30AM to 1:00PM
Wednesday	: 11:30AM to 1:00PM
Additional Hours	: By appointment

Course Description:

The objective of this course is to study DC and AC circuit analysis techniques; Kirchhoff's Laws; Thevenin and Norton transformations; transformers; DELTA to Y transformations; operational amplifiers; 1st order circuits and brief introduction to 2nd order circuits.

The student course learning objectives are:

1. Explain the concept of electric potential, current, and power.
2. Identify concepts of electric network topology: nodes, branches, and loops.
3. Describe the relationship of ideal voltage and current in resistors, capacitors and inductors.
4. Describe the relationship of ideal voltage and current in mutual inductance.
5. Apply Kirchhoff's Voltage Law (KVL) to analyze electric circuits.
6. Apply Kirchhoff's Current Law (KCL) to analyze electric circuits.
7. Explain the concept of Thevenin equivalent.
8. Explain the concept of Norton equivalent.
9. Apply Thevenin equivalent to circuits.
10. Apply Norton equivalent to circuits.
11. Analyze simple operational-amplifier circuits using an ideal op amp model.
12. Describe simple transformer circuits.
13. Perform transient analysis of first-order circuits.
14. Apply the phasor transform to sinusoidal steady state analysis of electric circuits.
15. Characterize the response of second order circuits.
16. Understand the importance of electric circuits in the real world.

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 (50%):**
   Homework will be assigned as mentioned in the course outline below. There will be five homework assignments and it should be submitted through Canvas 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 the 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, minimum score that you will earn is the average of previous three tests.
   It is important that you should attend **ALL** tests and should score at least 50% of grades in every test to be eligible for grade replacement policy. If you did not score 50% in any of the test, your grades will not be replaced.
   All tests are open books and notes; however, no internet resources should be used.

3. **Final Exam (10%):**
   Final exam as per University Schedule. Open books and notes.

90% and above:	A
80% and above and less than 90%:	B
70% and above and less than 80%:	C
60% and above and less than 70%:	D
Below 60%:	F

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

Course Outline:

Schedule	Topics	Assignments
Week 1: (Jan 10)	Basic Concepts	Review Syllabus
Week 2: (Jan 17)	Basic Laws	HW1 due on 01/26/22
Week 3: (Jan 24)	Methods of Analysis	Test 1 on 2/02/22
Week 4: (Jan 31)	Circuit Theorems	HW2 due on 2/16/22
Week 5: (Feb 7)	Capacitors and Inductors	
Week 6: (Feb 14)	AC Circuits	HW3 due on 2/23/22
Week 7: (Feb 21)	Review of topics studied in Week 1 through Week 5	
Week 8: (Feb 28)	Sinusoidal Steady State Analysis	Test 2 on 3/2/22
Week 9: (March 14)	AC Power Analysis	
Week 10: (March 21)	Magnetically Coupled Circuits	
Week 11: (March 28)	First Order Circuits	Test 3 on 3/23/22
Week 12: (April 4)	Second Order Circuits	HW4 due on 3/30/22
Week 13: (April 11)	Operational Amplifiers	Test 4 on 4/13/22
Week 14: (April 18)	Review	HW5 4/20/22
Week 15:	Final Exam	As per university schedule