

**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; Kirchhoff'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 Outcomes¹: 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]

¹Numbers 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.

²Numbers 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

<u>Prepared By:</u>	Premananda Indic	<u>Date:</u>	May 27, 2020
<u>Modified By:</u>			
<u>Modified By:</u>			

EENG 3304: Linear Circuits Analysis –I

Spring 2021 Syllabus

Instructor Information:

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

Office Hours (by appointment via zoom):

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.

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 to six 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 and it will be in class (this may change based on the health guidelines by the university); however, no internet resources should be used.

3. Midterm (10%)

There will be a midterm (closed books and notes)

4. 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 11)	Basic Concepts	Review Syllabus
Week 2: (Jan 18)	Basic Laws	HW1 due on 01/27/21
Week 3: (Jan 25)	Methods of Analysis	Test 1 on 2/03/21
Week 4: (Feb 1)	Circuit Theorems	HW2 due on 2/10/21
Week 5: (Feb 10)	Capacitors and Inductors	
Week 6: (Feb 15)	AC Circuits	HW3 due on 2/17/21
Week 7: (Feb 22)	Review of topics studied in Week 1 through Week 5	
Week 8: (March 1)	Sinusoidal Steady State Analysis	Test 2 on 3/3/21
Week 9: (March 15)	AC Power Analysis	
Week 10: (March 22)	Magnetically Coupled Circuits	HW4 due on 3/17/21
Week 11: (March 29)	First Order Circuits	Test 3 on 3/24/21
Week 12: (April 5)	Second Order Circuits	HW5 due on 4/07/21
Week 13: (April 12)	Operational Amplifiers	Test 4 on 4/14/21
Week 14: (April 19)	Review	
Week 15:	Final Exam	