

ECE 2300: Electrical Circuits and Electronic Devices

Course Description

Introduction to circuit analysis; circuit analysis concepts and mechanical systems analogies; theory and applications of electronic devices; operational amplifiers; electrical instruments and measurements.

Prior Course Number: 300, 309, 320

Transcript Abbreviation: ElecCirc&ElctrnDev

Grading Plan: Letter Grade

Course Deliveries: Classroom

Course Levels: Undergrad

Student Ranks: Sophomore, Junior, Senior

Course Offerings: Autumn, Spring

Flex Scheduled Course: Never

Course Frequency: Every Year

Course Length: 14 Week

Credits: 3.0

Repeatable: No

Time Distribution: 2.5 hr Lec, 1.5 hr Lab

Expected out-of-class hours per week: 5.0

Graded Component: Lecture

Credit by Examination: No

Admission Condition: No

Off Campus: Never

Campus Locations: Columbus, Marion

Prerequisites and Co-requisites: Prereq: Physics 1251 or 1261, and Math 1172 or 1544 or 2153 or 2162.01 or 2162.02 or 2182H or 4182H, and CPHR 2.0 or above, and enrollment in College of Engineering.

Exclusions: Not open to students majoring in ECE.

Cross-Listings:

Course Rationale: Existing course.

The course is required for this unit's degrees, majors, and/or minors: No

The course is a GEC: No

The course is an elective (for this or other units) or is a service course for other units: Yes

Subject/CIP Code: 14.1001

Subsidy Level: Baccalaureate Course

Course Goals

Master the basic laws of circuit theory
Be competent to analyze simple resistive or dc circuits
Be competent in the analysis of steady-state RC and RL circuits, including frequency domain concepts and filters
Be competent in the transient analysis of RC and RL circuits
Be familiar with the fundamentals of AC power circuits, including the distinction between three-phase and residential power wiring and distribution
Be competent in the analysis of basic ideal and non-ideal operational amplifier circuits
Be familiar with diodes and their application in rectifiers
Be familiar with the basics of electronic instrumentation and measurements

Course Topics

Topic	Lec	Rec	Lab	Cli	IS	Sem	FE	Wor
Fundamentals of electric circuits: Kirchhoffs current & voltage laws, power & sign conventions, Ohms law, practical sources & measuring devices	3.0		1.0					
Resistive network analysis: node voltage analysis, mesh current analysis, superposition & Thevenin equivalent, loading	4.5		1.0					
AC network analysis: capacitors and inductors, sinusoids and sinusoidal response; phasor analysis of sinusoidal circuits	3.0		1.0					
Transient analysis with emphasis on 1st order circuits and brief overview of 2nd order circuits	3.0		1.0					
Sinusoidal frequency response of RLC circuits, filter circuits	3.0		2.0					
Power in AC circuits, complex power, transformers, three-phase power, residential wiring & power distribution	3.0							
Ideal op-amps, basic op-amp circuits	4.5		2.0					
Diodes: ideal diode model and constant-voltage-drop circuit models, applications in rectifiers and for snubbers	3.0		1.0					
Bipolar junction transistors: operations, circuit models and applications	1.5		1.0					
Field-effect transistors: operations, circuit models and applications	1.5		1.0					
Electronic instrumentation and measurements: sensor interfacing, control output, embedded computing systems	3.0							

Grades

Aspect	Percent
Homework	20%
Midterm Exam 1	20%
Midterm Exam 2	20%
Final Exam	20%
Laboratory	20%

Representative Textbooks and Other Course Materials

Title	Author
<i>Principles and Applications of Electrical Engineering</i>	Rizzoni, Giorgio

ABET-EAC Criterion 3 Outcomes

Course Contribution	College Outcome
***	a An ability to apply knowledge of mathematics, science, and engineering.
**	b An ability to design and conduct experiments, as well as to analyze and interpret data.
	c An ability to design a system, component, or process to meet desired needs.
	d An ability to function on multi-disciplinary teams.
*	e An ability to identify, formulate, and solve engineering problems.
	f An understanding of professional and ethical responsibility.
	g An ability to communicate effectively.

Course Contribution		College Outcome
	h	The broad education necessary to understand the impact of engineering solutions in a global and societal context.
	i	A recognition of the need for, and an ability to engage in life-long learning.
	j	A knowledge of contemporary issues.
*	k	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Additional Notes or Comments

Change exclusion "and" to "or." Change outdated physics course numbers. Add FEH physics prereqs.

Add or 2153 or 2162.01 or 2162.02 or 2182H to rereqs 5/19/12

Add Math 1544 (154) and 4182H (264H) to prereqs. 10/19/12

Add Marion campus 11/13/12

Reword course goals, adjust grading. adjust lectures, got rid of recitations, deleted "EE" from program, delete outcome c 9/23/2014 BLA

Edited text info, 5/9/17, CED

Updated course goals based on Spring 2019 course and curriculum review. 5/22/19 GJV

synch with university version; get rid of quarter courses BLA 9/9/2019

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