ECE 2021 (Proposed): Introduction to Analog Systems and Circuits for Transfer Students Lecture

Course Description

Lecture-only component of ECE 2020, for transfer students. Circuit theory and applications of passive components and Op amps. Introduction to analog systems using differential equations and Laplace transforms.

Transcript Abbreviation: AnlgSys&CircuitLec
Grading Plan: Letter Grade
Course Deliveries: Classroom, Greater or equal to 50% at a distance
Course Levels: Undergrad
Student Ranks: Sophomore
Course Offerings:
Flex Scheduled Course: Never
Course Frequency: Every Year
Course Length: 14 Week
Credits: 2.5
Repeatable: No
Time Distribution: 2.5 hr Lec
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
Prerequisites and Co-requisites: Prereq: Math 1152 (152) or 1161.01 or 1161.02 or 1172 or 1181H or 161, and Physics 1250 or 1260 or 131, and CSE 1222 or 2221 or 202 or 205 or 221 or EnGraph 167 or Engr 1281.01H or 1281.02H or 1222 or Engineer 192.01H or 192.02H; and Engr 1182.01 or 1182.02 or 1182.03 or 1282.01H or 1282.02H or 1282.03H or Engineer 183 or 193H, or Engr 1186 (Engineer 186) and 1187 (187) and concur: 1188 (185) concurrent, or 1187 and 1188 and concur: 1186; and CPHR 2.00 or above.
Exclusions: Not open to students with credit for 2020, 2100, 2100.02, 2100.06, 2105, 2106, 2110, 2300, 205, 292, 294.03, or 301.
Cross-Listings:

Course Rationale: Allow transfer credit for students with prior course comparable to ECE 2020 lecture but no comparable lab.

The course is required for this unit's degrees, majors, and/or minors: Yes
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

Programs

Abbreviation	Description
CpE	Computer Engineering
EE	Electrical Engineering

General Information

Lectures 3x / week for 45 minutes a session.

Course Goals

Master circuit concepts such as voltage, current, charge, resistors, inductors, capacitors, etc.
Master how to analyze and design circuits using Ohm's Law, Kirchhoff's laws and superposition
Be competent in Phasor Domain sinusoidal techniques
Be competent in analyzing and designing steady state and transient behavior of RC, RL, RLC circuits
Be competent in Laplace Transform techniques
Be competent in analyzing and designing simple active filters based on ideal Op amps

Course Topics

Topic	Lec	Rec	Lab	Cli	IS	Sem	FE	Wor
Fundamentals of electric circuits: Charge, Voltage, Kirchhoff's Laws, power and sign conventions, Ohm's law, practical circuit elements	2.5							
Circuit Analysis Techniques: Node Voltage / Mesh analysis, superposition, Thevenin and Norton equivalents	4.0							
Ideal op amp, feedback, active filters, cascaded active filters	2.5							
RC and RL first-order circuits, natural and total response, RC Op amp circuits	2.5							
Initial and Final Conditions, Series and Parallel RLC, General solution of second-order circuits	2.5							
Laplace transforms, properties, pole zero diagrams and inverse Laplace transform	3.0							
System transfer function scaling, impulse response, step response, sinusoidal response, s-Domain circuit analysis	2.0							
Sinusoidal signals, Phasor domain analysis, impedance transformations	4.0							
RC, RL, RLC frequency response vs transient response	2.0							
Bode Plots, Passive and Active Filters	4.0							
Periodic Waveforms, Average and Complex Power, Maximum power Transfer	2.5							

Representative Assignments

Homework

Grades

Aspect	Percent
Homework	20%
Midterm Exam 1	25%
Midterm Exam 2	25%
Final Exam	30%

Representative Textbooks and Other Course Materials

Title	Author
Circuits	Ulaby and Maharbiz

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.
	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

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Adapted from ECE 2020 syllabus 10/6/2015 - gjv
Updated text info 5/9/17, CED
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