Introduction to Analog Systems and Circuits for Transfer Students Lecture

ECE 2021

Description / Conditions

Transcript Abbreviation:
AnlgSys&CircuitLec

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.

Course Levels:
Undegraduate (1000-5000 level)

Designation:
Elective
Required

General Education Course:
(N/A)

Cross-Listings:
(N/A)

Course Detail

Credit Hours (Minimum if “Range”selected):
2.50

Max Credit Hours:
2.50
Select if Repeatable:
Off

Maximum Repeatable Credits:
(N/A)

Total Completions Allowed:
(N/A)

Allow Multiple Enrollments in Term:
No

Course Length:
14 weeks (autumn or spring)
12 weeks (summer only)

Off Campus:
Never

Campus Location:
Columbus

Instruction Modes:
In Person (75-100% campus; 0-24% online)
Hybrid Class (25-74% campus; 25-74% online)

Prerequisites and Co-requisites:
Prereq: Math 1152 or 1161.01 or 1161.02 or 1172 or 1181H, and Physics 1250, 1250H or 1260, and CSE 1222 or 2221 or Engr 1281.01H or 1281.02H or 1222; and Engr 1182.01 or 1182.02 or 1182.03 or 1282.01H or 1282.02H or 1282.03H, or Engr 1186 and 1187 and concur: 1188 concurrent, or 1187 and 1188 and concur: 1186; and CPHR 2.00 or above.

Electronically Enforced:
No

Exclusions:
Not open to students with credit for 2020, 2100, 2100.02, 2100.06, 2105, 2106, 2110, or 2300.

Course Goals and Learning Objectives
Course Goals / Objectives:
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

Check if concurrence sought:
No

Contact Hours
### Contact Hours:

<table>
<thead>
<tr>
<th>Topic</th>
<th>LEC</th>
<th>REC out-of-class</th>
<th>REC in-class</th>
<th>Weekly LAB out-of-class</th>
<th>Weekly LAB in-class</th>
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<tbody>
<tr>
<td>Fundamentals of electric circuits: Charge, Voltage, Kirchhoff's Laws, power and sign conventions, Ohm's law, practical circuit elements</td>
<td>2.5</td>
<td>0.0</td>
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<tr>
<td>Circuit Analysis Techniques: Node Voltage / Mesh analysis, superposition, Thevenin and Norton equivalents</td>
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<tr>
<td>Ideal op amp, feedback, active filters, cascaded active filters</td>
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<tr>
<td>RC and RL first-order circuits, natural and total response, RC Op amp circuits</td>
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<tr>
<td>Initial and Final Conditions, Series and Parallel RLC, General solution of second-order circuits</td>
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<tr>
<td>Laplace transforms, properties, pole – zero diagrams and inverse Laplace transform</td>
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<td>System transfer function – scaling, impulse response, step response, sinusoidal response, s-Domain circuit analysis</td>
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<tr>
<td>Sinusoidal signals, Phasor domain analysis, impedance transformations</td>
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<td>RC, RL, RLC frequency response vs transient response</td>
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<td>Bode Plots, Passive and Active Filters</td>
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<td>Periodic Waveforms, Average and Complex Power, Maximum power Transfer</td>
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Grading and Texts

Grading Plan:
Letter Grade

Course Components:
Lecture

Grade Roster Component:
Lecture

Credit by Exam (EM):
No

Grades Breakdown:

<table>
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<th>Aspect</th>
<th>Percent</th>
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<tbody>
<tr>
<td>Homework</td>
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<tr>
<td>Midterm Exam 1</td>
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<tr>
<td>Midterm Exam 2</td>
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<td>Final Exam</td>
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Representative Textbooks and Other Course Materials:

<table>
<thead>
<tr>
<th>Title</th>
<th>Author</th>
<th>Year</th>
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<tbody>
<tr>
<td>Circuits</td>
<td>Ulaby and Maharbiz</td>
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ABET Student Learning Outcomes

ABET-CAC Criterion 3 Outcomes:
(N/A)

ABET-ETEC Criterion 3 Outcomes:
(N/A)

ABET-EAC Criterion 3 Outcomes:
(N/A)
Embedded Literacies (UG courses only)

Embedded Literacies Info:

Attachments / Additional Notes or Comments

Attachments:
(N/A)

Additional Notes or Comments:
(N/A)