Introduction to Discrete Time Signals & Systems Lecture

ECE 2051

Description / Conditions

Transcript Abbreviation:
Intr Disc Sig&Sys

Course Description:
Introduction to sampled time signals and linear time invariant sampled time systems. Lecture only.

Course Levels:
Undegraduate (1000-5000 level)

Designation:
Required

General Education Course:
(N/A)

Cross-Listings:
(N/A)

Course Detail

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

Max Credit Hours:
(N/A)
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)

Off Campus:
Never

Campus Location:
Columbus

Instruction Modes:
Distance Learning (100% online)

Prerequisites and Co-requisites:
Prereq: 2000, or 2060, or 2061 and 2067. Prereq or concur: Math 2174 or 2568.

Electronically Enforced:
No

Exclusions:
Not open to students with credit for 2100, 2100.01, 2100.04, 2104, 2110, or 2050.

Course Goals and Learning Objectives

Course Goals / Objectives:
Be competent with the fundamentals of discrete time linear time invariant (LTI) systems
Be competent is performing z-transforms and inverse z-transforms
Be competent in analyzing, designing and synthesizing discrete time LTI systems, including finite impulse response (FIR) and infinite impulse response (IIR) filters
Be familiar with sampling, analog to digital and digital to analog conversions
Be familiar with how to implement designs in hardware using modern techniques such as FPGAs and microcontrollers
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>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction to continuous &amp; discrete signals, sampling &amp; aliasing, quantization</td>
<td>2.0</td>
<td>0.0</td>
<td>0</td>
<td>0.0</td>
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<tr>
<td>Review of complex numbers</td>
<td>1.0</td>
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<tr>
<td>Discrete time signals and special functions</td>
<td>1.0</td>
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<tr>
<td>Discrete time systems descriptions &amp; properties: LTI systems, impulse response, FIR/IIR conditions, convolution, difference equations, zero-state and zero-input, flow diagrams</td>
<td>6.0</td>
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<tr>
<td>Z-transform techniques: two-sided vs one-sided z-transform, region of convergence (ROC), rational z-transforms, LTI systems in z-domain, power series and partial fraction expansion, transient and steady-state, stability</td>
<td>7.0</td>
<td>0.0</td>
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<tr>
<td>Steady-state frequency response of discrete time LTI systems: spectrum, Fourier series, discrete time Fourier transform &amp; relationship to z-transform, frequency response from poles &amp; zeros in transfer function</td>
<td>7.0</td>
<td>0.0</td>
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<tr>
<td>Frequency response of LTI systems and LTI frequency selective filters</td>
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<td><strong>Total</strong></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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<tr>
<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>
<td>25%</td>
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<tr>
<td>Midterm Exam 2</td>
<td>25%</td>
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<tr>
<td>Final Exam</td>
<td>30%</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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ABET Student Learning Outcomes

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

ABET-ETAC Criterion 3 Outcomes:
(N/A)
ABET-EAC Criterion 3 Outcomes:

<table>
<thead>
<tr>
<th>Substantial contribution (3-6 hours)</th>
<th>Outcome</th>
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<tbody>
<tr>
<td>1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics</td>
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<tr>
<td>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</td>
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<td>3. an ability to communicate effectively with a range of audiences - pre-2019 EAC SLO (g)</td>
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<td>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</td>
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<td>6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions</td>
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<td>7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies</td>
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Embedded Literacies (UG courses only)

Embedded Literacies Info:

Attachments / Additional Notes or Comments

Attachments:
(N/A)

Additional Notes or Comments:
(N/A)