ECE 313 – Signals and Systems

Department of Electrical and Computer Engineering
University of Massachusetts at Amherst

Fall 2010

Catalog Description

Continuous-time (CT) and discrete-time (DT) signal and system representations. Convolution, response of linear time-invariant (LTI) systems, impulse response. Frequency-domain analysis of CT and DT signals and systems: Fourier series, Fourier, Laplace and z-transforms. Sampling theorem, aliasing, filtering, modulation, frequency response, transfer functions.

Topical Course Outline

1) Introduction: types of signals and systems; examples. (Text, Chapter 1)
2) Continuous-time (CT) and discrete-time (DT) signals: properties and representations. (Chapters 2 and 3)
3) Properties of CT and DT systems: linearity, time-invariance, causality. (Chapters 4 and 5)
4) Time-domain DT systems analysis: impulse response, convolution sum, difference equation realization. (Chapter 7)
5) Time-domain CT system analysis: impulse response, convolution integral, differential equation realization. (Chapter 6)
6) CT Fourier Series: representations for periodic and time-limited signals; properties. (Chapter 8)
7) CT Fourier Transform: definition and properties; frequency-domain CT signal representations. (Chapter 10)
8) DT Fourier Transform: definition and properties; frequency-domain DT signal representations; relation of CT and DT transforms. (Chapter 11)
9) CT and DT system analysis with Fourier Transforms: frequency response; input-output relations; filter types and filter designs; applications to communication systems. (Chapters 12 and 13)
10) Sampling: representing a CT signal by a sampled (DT) signal: aliasing and interpolation; DT implementations of CT systems. (Sections 14.1, 14.2)
11) Discrete Fourier Transform (DFT): relation to CT and DT Fourier Transforms; use in filter implementations. (Sections 14.4, 14.5)
12) Laplace Transform: transfer function; poles and zeros; input-output relation; inverse transforms; relation of Laplace Transform to CT Fourier Transform. (Chapter 15)
Instructors
Prof. Patrick Kelly  Marcus 215B  kelly@ecs.umass.edu
Prof. Weibo Gong  Knowles 211E  gong@ecs.umass.edu

TAs  TBD (See course web site.)

Required Text


Prerequisites

Prerequisites: MATH 235, MATH 331, and a C or better in ECE 211, ECE 212, ECE 232 and ECE 242.

Course Web Site

Homework assignments, important announcements, and other items will be posted on the course web site, which should be checked regularly. The site is accessible through the OIT SPARK login page at

https://spark.oit.umass.edu/webct/logonDisplay.dowebct

(Bookmark it!) Be sure to run the browser check the first time you log in.

Meeting Times and Locations

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<tr>
<th>Lecture</th>
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<td>9:30-10:45 AM</td>
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<td>Discussion</td>
<td>Sect D01</td>
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<td>10:10-11:00 AM</td>
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<td>Sect D02</td>
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<td>Sect D03</td>
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Office Hours:  TBD (See course web site for instructor and TA office hours.)
Grading

Midterm 1 (Oct. 13, 6-8 PM) – 30%
Midterm 2 (Nov. 10, 6-8 PM) – 30%
Final Exam (Date TBD) – 30%
Homework – 10%

Honors Colloquium

A one-credit honors colloquium (E&C-ENG HO1, Sec. 1) is available for this course, which is a requirement for Commonwealth College students in the EE or CSE Departmental Honors tracks. The meeting times will be announced in lecture.

Course Policies and Friendly Advice

• Homework is due at the beginning of lecture on the due date. Out of fairness to all students, late homework will not be accepted.
• Make-up exams will be given only if you provide a valid written excuse and notify Prof. Kelly AND Prof. Gong prior to the missed exam. Other missed exams will be considered failures. Excused absences are defined in the UMass Policy on Class Absences at: www.umass.edu/provost/admin/policies/absence.html.
• Please try to arrive in class a few minutes before the starting time. Late arrival is distracting and inconsiderate.
• Homework and exams will be based heavily on class notes and discussions. Examinations assume familiarity with all lectures, discussions, and homework problems. You are expected to attend all classes and are responsible for knowing the material and assignments from every lecture and discussion.
• If you are having difficulties with any of the material, come see us during our office hours or make other arrangements with us for help! Do so before you fall behind. You won’t have trouble finding us, and that’s what we’re here for.

Academic Honesty

Cheating and other forms of academic dishonesty will not be tolerated, and will be handled in accordance with the UMass Academic Honesty Policy:

www.umass.edu/dean_students/codeofconduct/acad honesty/
Accommodation Policy

The University of Massachusetts is committed to providing an equal educational opportunity for all students. If you have a documented physical, psychological or learning disability on file with Disability Services (DS), Learning Disability Support Services (LDSS) or Psychological Disabilities Services (PDS), you may be eligible for reasonable academic accommodations to help you succeed in this course. If you have a documented disability that requires an accommodation, please notify Prof. Kelly within the first two weeks of the semester so that we may make appropriate arrangements.