UVic
Department of Electrical and Computer Engineering

ELEC 260
Continuous-Time Signals and Systems

Course Outline (Summer 2014)

Instructor:

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Course Web Site:

Home Page: http://www.ece.uvic.ca/~mdadams/courses/elec260
Username: elec260
Password: as announced during the first lecture

Office Hours:

As announced during the lectures and posted on the course web site.

Lectures:

Sections: A01 (CRN 30280), A02 (CRN 30281)
Time/Location: Tuesdays, Wednesdays, and Fridays 11:30–12:20 in ECS 116

Tutorials:

Section: T01 (CRN 30282)
Mondays 13:30–14:20 in ELW B215

Section: T02 (CRN 30283)
Fridays 12:30–13:20 in ELW B215

Section: T03 (CRN 30284)
Fridays 13:30–14:20 in ELW B215

Description:

This course provides a basic introduction to continuous-time signals and systems.

Topics:

1. Signals and systems (6 hours): basic definitions/concepts, review of complex analysis, signal properties, system properties, basic signal transformations, elementary signals, signal representations using elementary signals.
2. Linear time-invariant (LTI) systems (6 hours): convolution, properties of convolution, representation of signals using impulses, impulse response and convolution representation of LTI systems, properties of LTI systems, response of LTI systems to complex exponential signals.
3. Fourier series (5 hours): Fourier series definition, finding Fourier series representations of signals, convergence of Fourier series, properties of Fourier series, Fourier series and frequency spectra, Fourier series and LTI systems.
4. Fourier transform (8 hours): Fourier transform definition, convergence of Fourier transform, Fourier transform properties, Fourier transform of periodic signals, frequency spectra of signals, frequency response of LTI systems, applications.
5. Laplace transform (8 hours): Laplace transform definition, relationship between Laplace transform and Fourier transform, region of convergence, finding the inverse Laplace transform, properties of the Laplace transform, analysis of systems using the Laplace transform, solving differential equations using the unilateral Laplace transform.

Learning Outcomes:

Upon completion of the course, students should be able to:

- define various properties of systems (such as linearity, time invariance, causality, memory, invertibility, and BIBO stability) and determine if a system has each of these properties
- identify basic properties of convolution and compute the convolution of functions
- explain the significance of convolution in the context of LTI systems
- state the basic properties of the Fourier and Laplace transforms and use these properties in problem solving
- compute forward/inverse Fourier and Laplace transforms of functions and find Fourier series representations of periodic functions
- use the Fourier transform and/or Laplace transform to design and analyze simple systems (e.g., filtering/equalization systems, amplitude modulation systems, and feedback control systems)
- use the Laplace transform to solve differential equations
- demonstrate competency in working with both time- and frequency-domain representations of signals and systems
- explain the relationships amongst the various representations of LTI systems (e.g., differential equation, frequency response, transfer function, impulse response)
- identify basic types of frequency-selective filters (i.e., lowpass, highpass, and bandpass)
- explain the fundamentals of sampling and the implications of the sampling theorem
- use MATLAB effectively for problem solving

Required Texts/Materials:

The following references are required for the course:

1. Textbook (Espresso book machine, print on demand; available from University Bookstore):
   M. D. Adams, *Continuous-Time Signals and Systems*, University of Victoria, Victoria, BC, Canada, 2013, ISBN 978-1-55058-495-0 (paperback).
2. Textbook Lecture Slides (Espresso book machine, print on demand; available from University Bookstore):
   M. D. Adams, *Lecture Slides for Continuous-Time Signals and Systems*, University of Victoria, Victoria, BC, Canada, 2013, ISBN 978-1-55058-517-9 (paperback).

Optional Texts/Materials:

The following textbook can be considered as a source of additional explanations and extra worked-through example problems:

A. V. Oppenheim and A. S. Willsky with S. H. Nawab, *Signals & Systems*, 2nd edition, Prentice-Hall, Upper Saddle River, NJ, USA, 1997, ISBN 0-13-814757-4.

Assessment:

10% Assignments† (equally weighted)
40% Midterm Exams‡ (two of equal weight, scheduled for Tuesday June 10 and Tuesday July 15),
50% Final Exam‡

Course-Materials Bug-Bounty Program Bonus*: 1% (of course mark)

***Note:** See the handout titled “Course-Materials Bug-Bounty Program” for more details.
†**Note:** The submission deadlines for assignments will be posted on the course web site. Assignments constitute an essential component of this course. Failure to complete at least half of the assignments each with a mark of at least 50% will result in the student being refused entry to the final examination and an N grade being awarded for the course. Late assignments will not be accepted and will receive a mark of zero.
‡**Note:** All exams are closed book. Calculators are not permitted in exams.

Importance of Email:

Important course announcements are often sent to students via email. Therefore, students are responsible for checking their email regularly.

Other Important Documents Available from Course Web Site:

1. Course-Materials Bug-Bounty Program Handout (See section titled “Course-Materials Bug-Bounty Program”)

2. Course-Materials Errata Handout (See section titled “Course-Materials Bug-Bounty Program”)
3. Optional Textbook Handout (See section titled “Optional Texts/Materials”)
4. Assignments Handout (See section titled “Assignments”)

Percentage to Letter-Grade Conversion:

The final grade obtained in the course will be based on the following percentage to letter-grade conversion:

Percentage Grade x	Letter Grade	Percentage Grade x	Letter Grade
$90 \leq x \leq 100$	A+	$65 \leq x < 70$	C+
$85 \leq x < 90$	A	$60 \leq x < 65$	C
$80 \leq x < 85$	A-	$50 \leq x < 60$	D
$77 \leq x < 80$	B+	$35 \leq x < 50$	E†
$73 \leq x < 77$	B	$0 \leq x < 35$	F‡
$70 \leq x < 73$	B-		

†Fail, conditional supplemental exam (for undergraduate courses only).
‡Fail, no supplemental exam.

Supplemental Exams:

For regulations regarding supplemental exams, see:
http://web.uvic.ca/calendar2014/FACS/UnIn/UARe/USEx.html.

Handling Concerns About Course:

Students who have issues with the conduct of the course should discuss them with the instructor first. If these discussions do not resolve the issue, then students should feel free to contact the ECE Chair by email or the ECE Chair’s secretary to set up an appointment.

Accommodation of Religious Observance:

See http://web.uvic.ca/calendar2014/GI/GUPo.html.

Policy on Inclusivity and Diversity:

See http://web.uvic.ca/calendar2014/GI/GUPo.html.

Standards of Professional Behaviour:

You are advised to read the Faculty of Engineering document “Standards for Professional Behaviour” at http://www.uvic.ca/engineering/assets/docs/professional-behaviour.pdf which contains important information regarding conduct in courses, in labs and in the general use of facilities.

Cheating, plagiarism, and other forms of academic fraud are taken very seriously by both the University and the Department. You should consult http://web.uvic.ca/calendar2014/FACS/UnIn/UARe/PoAcI.html for the UVic policy on academic integrity.

Plagiarism Detection Tools:

Plagiarism detection software may be used to aid the instructor and/or teaching assistants in the review and grading of some or all student work.

This book offers an extended description of continuous-time signals related to signals and systems. As a time-varying process of any physical state of any object, which serves for representation, detection, and transmission of messages, a modern electrical signal possesses, in applications, many specific properties. The text covers principle foundations of signals theory. Presenting bandlimited and analytic signals, the book reviews the methods of their description, transformation (by Hilbert transform), and sampling. Show more Show less. Discover the world's research. Continuous-Time Signals â€¢ To begin with signals will be classified by their support interval Two-Sided Infinite-Length Signals â€¢ Sinusoids are a primary example of infinite duration signals, that are also periodic ECE 2610 Signal and Systems 9â€“1 Continuous-Time Signals x (t) = A cos (Ï‰ 0 t + Ï†), â€“ âˆž < t < âˆž jÏ† jÏ‰ 0 t x (t) =.Â Two-sided exponential 1.0 0.5 10 ECE 2610 Signals and Systems 5 t 9â€“2 Continuous-Time Signals One-Sided Signals â€¢ Another class of signals are those that exist on a semi-infinite interval, i.e., are zero for t < t 0 (support t âˆˆ [0, âˆž)) â€¢ The continuous-time unit-step function, u (t) , is useful for describing. summer-2014-timetable and Moodle. Consultations: You are welcome to email the tutor or laboratory demonstrator, who can answer your questions on this course and can also provide you with consultation times. You are encouraged to ask questions during and after the lab and tutorial classes.Â Following courses The course is a pre-requisite for all professional electives in the Signal Processing group, including ELEC4621 Advanced Digital Signal Processing and ELEC4622 Multimedia Signal Processing. Learning outcomes At the end of the course students should: 1.Â Sampling continuous signals: the sampling theorem, reconstruction, aliasing and the z-transform. Analogue filters: Butterworth filters. Filter impulse and frequency responses, stability and digital oscillators. Schaum's Outline of Theory and Problems of. Signals and systems. Copyright Â© 1995 by The McGraw-Hill Companies, Inc. All rights reserved.Â If the course you are taking covers only continuous-time signals and systems, you may study parts of Chapters 1 and 2 covering the continuous-time case, Chapters 3 and 5, and the second part of Chapter 7. If the course you are taking covers only discrete-time signals and systems, you may study parts of Chapters 1 and 2 covering the.