Faculty of Engineering
Course Outline

ELEC 260 — Continuous-Time Signals and Systems
Summer 2015

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 30300), A02 (CRN 30301)
Time/Location: Tuesdays, Wednesdays, and Fridays 11:30–12:20 in ECS 125

Tutorials:
Section: T01 (CRN 30302)
Mondays 15:30–16:20 in ELW B215

Section: T02 (CRN 30303)
Thursdays 13:30–14:20 in ELW B215

Section: T03 (CRN 30304)
Fridays 13:30–14:20 in ELW B215

Description and Objectives:
This course provides a basic introduction to continuous-time signals and systems. The course is intended to teach students mathematical techniques for the design and analysis of systems.

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

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.

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.

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")

Importance of Email:

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

Assessment:

10% Assignments[†] (equally weighted)
40% Midterm Exams[‡] (two of equal weight, scheduled for Tue. June 9 and Tue. July 14)
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.

Percentage to Letter-Grade Conversion:

The final grade obtained from the above marking scheme for the purpose of GPA calculation will be based on the percentage-to-grade point conversion table as listed in the current Undergraduate Calendar. See http://web.uvic.ca/calendar/FACS/UnIn/UARe/Grad.html

Supplemental Exams:

There will be no supplemental examination for this course.

Note to Students (Regarding 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 Chair of the Department by email or the Chair's Secretary to set up an appointment.

Accommodation of Religious Observance:

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

Policy on Inclusivity and Diversity:

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

Standards of Professional Behaviour:

You are advised to read the Faculty of Engineering document Standards for Professional Behaviour in the current Undergraduate Calendar, which contains important information regarding conduct in courses, 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 entry in current Undergraduate Calendar for the UVic policy on academic integrity.

See http://www.uvic.ca/engineering/assets/docs/professional-behaviour.pdf

Course Lecture Notes:

Unless otherwise noted, all course materials supplied to students in this course have been prepared by the instructor and are intended for use in this course only. These materials are not to be re-circulated digitally, whether by email or by uploading or copying to websites, or to others not enrolled in this course. Violation of this policy may in some cases constitute a breach of academic integrity as defined in the UVic Calendar.

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.