



University
of Victoria

Faculty of Engineering, Electrical and Computer Engineering
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COURSE OUTLINE

ECE 260 — Continuous-Time Signals and Systems Fall 2019

Instructor:

Dr. Michael Adams
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Course Web Site:

Home Page: <https://www.ece.uvic.ca/~mdadams/courses/ece260>
Username: ece260
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 10922), A02 (CRN 10923)
Time/Location: Tuesdays, Wednesdays, and Fridays 13:30–14:20 in ECS 125

Tutorials:

Section: T01 (CRN 10924)
Mondays 13:30–14:20 in ELW B215
Section: T02 (CRN 10925)
Thursdays 14:30–15:20 in ELW B215
Section: T03 (CRN 10926)
Mondays 14:30–15:20 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 (print-on-demand book; available from University Bookstore):
M. D. Adams, *Continuous-Time Signals and Systems (Version 2013-09-11)*, University of Victoria, Victoria, BC, Canada, 2013, ISBN 978-1-55058-495-0 (paperback).
2. Textbook Lecture Slides (print-on-demand book; available from University Bookstore):
M. D. Adams, *Lecture Slides for Signals and Systems (Version: 2016-01-25)*, University of Victoria, Victoria, BC, Canada, 2016, ISBN 978-1-55058-584-1 (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 the 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.

Lecture Attendance:

Students are required to attend all lectures in the course. If a student is unable to attend a lecture due to illness or some other reason, the student is solely responsible for any information missed (including any course-related announcements). Any student who does not attend lectures regularly places themselves at a **very serious disadvantage** in the course.

Assessment:

- 10% Assignments[†] (equally weighted)
- 40% Midterm Exams[‡] (two of equal weight, scheduled for Friday Oct. 11 and Tuesday Nov. 19)
- 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.

Maintenance of Marks:

Course marks are maintained (securely) on a server external to the University. Typically, a service like Google Docs/Sheets is used. Only the instructor and markers for the course are given access to this information. If a student has any concerns about this practice, they should contact the instructor as soon as possible during the first week of the term so that alternative arrangements for the maintenance of marks can be made.

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.

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 <https://web.uvic.ca/calendar2019-09/undergrad/info/regulations/grading.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 Assistant to set up an appointment.

Course Withdrawal Deadlines:

- September 17: Withdrawal with 100% reduction of tuition fees
- October 8: Withdrawal with 50% reduction of tuition fees
- October 31: Last day for withdrawal (no fees returned)

Accommodation of Religious Observance:

See <https://web.uvic.ca/calendar2019-09/undergrad/info/regulations/religious-observance.html>.

Policy on Inclusivity and Diversity:

See <https://web.uvic.ca/calendar2019-09/general/policies.html>.

Standards of Professional Behaviour:

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

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 <https://web.uvic.ca/calendar2019-09/undergrad/info/regulations/academic-integrity.html>.

Equality:

This course aims to provide equal opportunities and access for all students to enjoy the benefits and privileges of the class and its curriculum and to meet the syllabus requirements. Reasonable and appropriate accommodation will be made available to students with documented disabilities (physical, mental, learning) in order to give them the opportunity to successfully meet the essential requirements of the course. The accommodation will not alter academic standards or learning outcomes, although the student may be allowed to demonstrate knowledge and skills in a different way. It is not necessary for you to reveal your disability and/or confidential medical information to the course instructor. If you believe that you may require accommodation, the course instructor can provide you with information about confidential resources on campus that can assist you in arranging for appropriate accommodation. Alternatively, you may want to contact the Centre for Accessible Learning located in the Campus Services Building. The University of Victoria is committed to promoting, providing, and protecting a positive, and supportive and safe learning and working environment for all its members.

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.

Sexualized Violence Prevention and Response at UVic:

UVic takes sexualized violence seriously, and has raised the bar for what is considered acceptable behaviour. We encourage students to learn more about how the University defines sexualized violence and its overall approach by visiting <https://www.uvic.ca/svp>. If you or someone you know has been impacted by sexualized violence and needs information, advice, and/or support, please contact the Sexualized Violence Resource Office in Equity and Human Rights (EQHR). Whether or not you have been directly impacted, if you want to take part in the important prevention work taking place on campus, you can also reach out:

- Where: Sexualized Violence Resource Office in EQHR; Sedgewick C119
- Phone: 250-721-8021
- Email: svpcoordinator@uvic.ca
- Web: <https://www.uvic.ca/svp>

Office of the Ombudsperson:

The Office of the Ombudsperson is an independent and impartial resource to assist with the fair resolution of student issues. A confidential consultation can help you understand your rights and responsibilities. The Ombudsperson can also clarify information, help navigate procedures, assist with problem-solving, facilitate communication, provide feedback on an appeal, investigate, and make recommendations. Phone: 250-721-8357; Email: ombuddy@uvic.ca; Web: <https://uvicombudsperson.ca>