

**University
of Victoria**

Faculty of Engineering, Electrical and Computer Engineering
Engineering Office Wing Room 448
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COURSE OUTLINE

ECE 260 — Continuous-Time Signals and Systems Summer 2020

Specification of Dates/Times:

Unless explicitly indicated otherwise, all dates and times are specified using Pacific Daylight Time (i.e., local time in Victoria, BC, Canada). This statement applies in totality to all written and verbal communication for the course, including but not limited to: assignment submission deadlines, the dates/times for tests/exams, lecture and tutorial times, office hours, and any dates/times specified on handouts, the course web site, or Coursespaces.

Instructor:

Dr. Michael Adams
Office: EOW 311
Email: mdadams@ece.uvic.ca
Web: <https://www.ece.uvic.ca/~mdadams>

Course Web Site:

Home Page: <https://www.ece.uvic.ca/~mdadams/courses/ece260>
Username: ece260
Password: as announced on UVic Coursespaces at <https://coursespaces.uvic.ca/mod/forum/discuss.php?d=823789#p2251886>

The course web site is the **primary online source of information** for the course.

UVic Coursespaces:

Home Page: <https://coursespaces.uvic.ca/course/view.php?id=78398>

Note: Although the course has a Coursespaces site, the primary online source of information for the course is the course web site (introduced above), not Coursespaces. Coursespaces is mainly intended to be used for: 1) providing the username and password to be used for accessing password-protected areas of the course web site; 2) submitting (and grading) assignments; and 3) writing (and grading) tests/exams.

Office Hours:

As posted on the course web site.

Teaching Assistants (TAs):

The tutorial and marker teaching assistants (TAs) are listed on the course web site along with their contact information.

Lectures:

Sections: A01 (CRN 30295), A02 (CRN 30296)

Time/Location: Tuesdays, Wednesdays, and Fridays 10:30–11:20 in online meeting room

Note: The first lecture time slot will be used for a live course introduction (using either Zoom or Blackboard Collaborate). At the time of this writing, the main lecture content (i.e., the lecture content excluding the course introduction) is planned to be delivered via prerecorded videos that will be made available on YouTube. Since the preparation of such videos is extremely time consuming, it still remains to be seen whether there will be sufficient time for these videos to be prepared in advance. In the event that the some content cannot be recorded in advance, the lecture time slot will be used for live delivery of the material (using either Zoom or Blackboard Collaborate). Any lecture time slots that are not used for live content delivery are reserved for other purposes

(such as office hours) as needed. The URLs and passwords needed to access any online meetings held in the lecture time slots will be made available via email to the class list and/or posting in a password-protected area of the course web site.

Tutorials:

Section: T01 (CRN 30297)

Thursdays 09:00–09:50 in online meeting room

Section: T02 (CRN 30298)

Thursdays 13:30–14:20 in online meeting room

Section: T03 (CRN 30299)

Mondays 13:30–14:20 in online meeting room

Section: T04 (CRN 30300)

Fridays 12:30–13:20 in online meeting room

Note: For each tutorial section, the tutorial time slots will be used by the tutorial TA to hold regularly scheduled online meetings (using either Zoom or Blackboard Collaborate) in order to help students with course materials. The precise format of these online meetings is at the discretion of the TA, but will likely have both lecture-style and interactive components. The URLs and passwords needed to access any online meetings held in the tutorial time slots will be provided to students by the TA (most likely by email).

Online Course Delivery:

As the course will be conducted online during this term, students will need to complete assignments and write tests/exams online. The students will require access to a computer that can be used to participate in online meetings for lectures/tutorials as well as write online exams. Students will need to use the MATLAB software in order to complete some assignments. Therefore, students are required to either install the MATLAB software on their own computer or ensure that they have access to MATLAB through some other means.

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*, Edition 2.0, University of Victoria, Victoria, BC, Canada, 2020, ISBN 978-1-55058-657-2 (paperback).
2. Textbook Lecture Slides (print-on-demand book; available from University Bookstore):
M. D. Adams, *Lecture Slides for Signals and Systems*, Edition 2.0, University of Victoria, Victoria, BC, Canada, 2020, ISBN 978-1-55058-661-9 (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.

Video Lectures:

Some of the course content will be delivered in the form of video lectures. Information about these video lectures can be found on the course web site.

Other Important Documents Available from the Course Web Site:

1. Course Video-Lecture Information Package (See section titled “Video Lectures”)
2. Video-Lecture Catalog Handout (See section titled “Video Lectures”)
3. Assignments Handout (See section titled “Assignments”)
4. Course-Materials Bug-Bounty Program Handout (See section titled “Course-Materials Bug-Bounty Program”)
5. Course-Materials Errata Handout (See section titled “Course-Materials Bug-Bounty Program”)
6. Optional Textbook Handout (See section titled “Optional Texts/Materials”)

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 responsible for all material covered in live and prerecorded lectures. If a student is unable to attend a live lecture due to illness or some other reason, the student is solely responsible for any information missed (including any course-related announcements).

Assessment:

- 10% Assignments (equally weighted)
The submission deadlines for assignments will be posted on the course web site. Late assignments will not be accepted and will receive a mark of zero.
- 90% Tests (five tests with the relative weights $\frac{5}{24} : \frac{5}{24} : \frac{5}{24} : \frac{5}{24} : \frac{4}{24}$ where the last test is the one with the lower weight)
The dates/times and online locations for tests will be posted on the course web site. All tests will be scheduled during the lecture time slots. The last test will be scheduled in the last lecture time slot. All tests are closed book. Calculators are not permitted in tests.

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

See the handout titled “Course-Materials Bug-Bounty Program” for more details.

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://www.uvic.ca/calendar2020-05/undergrad/index.php#/policy/S1AAgoGuV?bc=true&bcCurrent=14%20-%20Grading&bcItemType=policies>.

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:

- May 16, 2020. Withdrawal with 100% reduction of tuition fees.
- June 6, 2020. Withdrawal with 50% reduction of tuition fees.
- July 1, 2020. Last day for withdrawal (no fees returned).

Accommodation of Religious Observance:

See <https://www.uvic.ca/calendar2020-05/undergrad/index.php#/policy/r1q0gofdN?bc=true&bcCurrent=10%20-%20Accommodation%20of%20Religious%20Observance&bcItemType=policies>.

Policy on Inclusivity and Diversity:

- Faculty of Engineering. <https://www.uvic.ca/engineering/about/equity/index.php>.
- Undergraduate Calendar. <https://www.uvic.ca/calendar2020-05/undergrad/index.php#/policy/HkQ0pzdAN>.

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>.

Academic Integrity:

Cheating, plagiarism and other forms of academic fraud are taken very seriously by both the University and the Department. You should consult the entry in current Undergraduate Calendar for the UVic policy on academic

integrity. See https://www.uvic.ca/calendar2020-05/undergrad/index.php#/policy/Sk_0xsM_V?bc=true&bcCurrent=08%20-%20Policy%20on%20Academic%20Integrity&bcItemType=policies.

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 (CAL) located in the Campus Services Building. The CAL web site can be found at <https://www.uvic.ca/services/cal>. 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>