Course Outline

ECE 3780 – Signal Processing 1

Fall 2021

IMPORTANT NOTICE – Mandatory Requirement to Report

This course will be conducted using remote instruction. Students who are accessing the course from outside of Canada or the USA must notify the instructor and indicate in which country they are located. Access to software may be restricted from some countries and failure to comply with these restrictions may result in criminal prosecution.

Course Objectives

Introduction to signals and systems; spectral analysis (Fourier Series) of continuous-time periodic signals; spectral analysis of aperiodic signals (Fourier Transform); the impulse response and convolution operation; frequency analysis of linear time-invariant systems; A/D conversion; sampling. Lab periods will be used to give students hands-on experience in programming many of the techniques covered in the theoretical parts of the course.

Course Content

The following topics will be covered:

• Introduction to signals and systems.
• Time-domain analysis of continuous/discrete-time systems linear shift-invariant systems.
• Spectral analysis of continuous-time signals: Fourier series and Fourier transform.
• Spectral analysis of discrete-time signals: Discrete Fourier Transform.

Textbook


Academic Integrity

Students are expected to conduct themselves in accordance with the highest ethical standards of the Profession of Engineering and evince academic integrity in all their pursuits and activities at the university. As such, in accordance with the General Academic Regulations on Academic Integrity, students are reminded that plagiarism or any other form of cheating in examinations, term tests, assignments, projects, or laboratory reports is subject to serious academic penalty (e.g. suspension or expulsion from the faculty or university). A student found guilty of contributing to cheating by another student is also subject to serious academic penalty.

Copyright Notice

All materials provided in this course are copyright and are provided under the fair dealing provision of the Canadian Copyright Act. This material may not be redistributed in any manner without the express written permission of the relevant copyright holder.

Retention of Student Work

Students are advised that copies of their work submitted in completing course requirements (i.e. assignments, laboratory reports, project reports, test papers, examination papers, etc.) may be retained by the instructor and/or the department for the purpose of student assessment and grading, and to support the ongoing accreditation of each Engineering program. This material shall be handled in accordance with the University’s Intellectual Property Policy and the protection of privacy provisions of The Freedom of Information and Protection of Privacy Act (Manitoba). Students who do not wish to have their work retained must inform the Head of Department, in writing, at their earliest opportunity.
Learning Outcomes

1. Identify, distinguish and explain signals such as the unit step, impulse, and exponential that will be covered during the course as well as the basic definitions and properties of systems.
2. Analyze time-domain continuous and discrete - time systems and calculate the output response from linear systems.
3. Analyze and synthesize signals by Fourier series and Fourier transform.
4. Explain and solve problems related to applications such as filtering and communication systems.
5. Understand the basics of signal sampling and reconstruction.

Expected Competency Levels

<table>
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<tr>
<th>Outcome</th>
<th>KB</th>
<th>PA</th>
<th>IN</th>
<th>DE</th>
<th>ET</th>
<th>IT</th>
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Evaluation

The final course grade will be determined from a student's performance in laboratories, tests and on the final examination. All laboratories must be completed in order to receive a passing grade in this course.

Component | Value (%) | Method of Feedback | Learning Outcomes Evaluated
--- | --- | --- | ---
Assignments | 40 | F, S | 1, 2, 3, 4
Laboratories | 20 | F, S | 1, 2, 3, 4
Final Examination | 40 | S | 3, 4

* Method of Feedback: F - Formative (written comments and/or oral discussion), S - summative (numerical grade)

CEAB Graduate Attributes Assessed

IN.1 – Gathers information (literature review, measurements, experiments, laboratory exercises) and analyzes data.

IT.2 – Contributes equitably to completion of group work.

Requirements and Regulations

- Attendance at lectures and laboratories is essential for successful completion of this course. Students must satisfy each evaluation component in the course to receive a final grade.
- It is the responsibility of each student to contact the instructor in a timely manner if he or she is uncertain about his or her standing in the course and about his or her potential for receiving a failing grade. Students should also familiarize themselves with the University’s General Academic Regulations, as well as Section 3 of the Faculty of Engineering Academic Regulations dealing with incomplete term work, deferred examinations, attendance and withdrawal.
- No programmable devices or systems (such as calculators, PDAs, iPods, iPads, cell phones, wireless communication or data storage devices) are allowed in examinations unless approved by the course instructor.
- Students should be aware that they have access to an extensive range of resources and support organizations. These include Academic Resources, Counselling, Advocacy and Accessibility Offices as well as documentation of key University policies e.g. Academic Integrity, Respectful Behaviour, Examinations and related matters.

Supplemental Resources
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Note: These boundaries represent a guide for the instructor and class alike. Provided that no individual student is disadvantaged, the instructor may vary any of these boundaries to ensure consistency of grading from year-to-year.