ECE405: Error Control Coding

Territory Acknowledgement

We acknowledge and respect the Lək̓ʷəŋən (Songhees and Esquimalt) Peoples on whose territory the university stands, and the Lək̓ʷəŋən and W̱SÁNEĆ Peoples whose historical relationships with the land continue to this day.

Course Dates

CRN(s):	Section A01 CRN: 20907
Term:	2025
Course Start:	2025-01-06
Course End:	2025-04-25
Withdrawal with 100% reduction of tuition fees:	2025-01-19
Withdrawal with 50% reduction of tuition fees:	2025-02-09
Last day for withdrawal (no fees returned):	2025-02-28

Cross-listed With

Cross-Listed Course(s): ECE511

Scheduled Meeting Times (M=Mon, T=Tue, W=Wed, R=Thu, F=Fri)

Section:	Location:	Classes Start:	Classes End:	Days of week:	Hours of day:	Instructor:
A01	ELL 061	2025-01-06	2025-04-04	TWF	10:30-11:20	Aaron Gulliver

Instructor(s)

Name: **Aaron Gulliver**
Office: EOW 325
Phone: (250) 721-6028
Email: agullive at engr dot uvic dot ca

Office Hours:	Comments
Wed 11:30am-01:30pm	

Course Pre- & Co-requisites

Prerequisites

- Minimum fourth-year standing in the Faculty of Engineering and Computer Science.
- or permission of the department.

TA Information

TA Information can be found on the course website: https://www.ece.uvic.ca/~agullive/405.html

Course Description

The channel coding problem; coding approaches and characteristics; linear block codes; bounds on codes; finite fields; cyclic, BCH and Reed-Solomon codes; convolutional codes and the Viterbi algorithm; error control in data storage and

transmission systems.

Learning Outcomes

By the end of this course, students will be able to:

1. Explain the need for error correction in data communication and storage systems.
2. Apply mathematical tools from group and finite field theory in the design of codes.
3. Describe the fundamental limits of error correction.
4. Demonstrate the decoding of block codes including cyclic codes.
5. Explain the operation of convolutional encoders and decoders.

Syllabus

1. Introduction; The channel coding problem
2. Vector spaces; Linear block codes
3. Groups, rings and fields; Primitive and irreducible polynomials
4. Polynomial rings and cyclic codes
5. BCH and Reed-Solomon codes
6. Convolutional codes and the Viterbi algorithm

Textbook & Course Materials

Title:	**Forward Error Correction via Channel Coding**
Author:	**Orhan Gazi**
Publisher/Year:	**Springer/2020**

Course Delivery

This course will be offered face-to-face.

Learning & Teaching Technologies

- Brightspace: https://bright.uvic.ca/d2l/home/363674
- Course Website: http://www.ece.uvic.ca/~agullive/405.html

Assessment

	Weight	Date
5 Assignments	50%	TBD
Mid-term	20%	February 25, 2025
Final Exam	30%	TBD

Notes

- 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.
- Coursework Mark Appeals: All marks must be appealed within 7 days of the mark being posted.
- A supplemental exam will not be offered in this course.

General Information

Note to students: 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 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.

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. 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.

Academic Integrity requires commitment to the values of honesty, trust, fairness, respect, and responsibility. It is expected that students, faculty members and staff at the University of Victoria, as members of an intellectual community, will adhere to these ethical values in all activities related to learning, teaching, research and service. Any action that contravenes this standard, including misrepresentation, falsification or deception, undermines the intention and worth of scholarly work and violates the fundamental academic rights of members of our community. This policy is designed to ensure that the university's standards are upheld in a fair and transparent fashion.

Attendance: Students are expected to attend all classes in which they are enrolled. An academic unit may require a student to withdraw from a course if the student is registered in another course that occurs at the same time.

An Instructor may refuse a student admission to a lecture, laboratory, online course discussion or learning activity, tutorial or other learning activity set out in the course outline because of lateness, misconduct, inattention or failure to meet the responsibilities of the course set out in the course outline. Students who neglect their academic work may be assigned a final grade of N or debarred from final examinations.

Students who do not attend classes must not assume that they have been dropped from the course by an academic unit or an instructor. Courses that are not formally dropped will be given a failing grade, students may be required to withdraw and will be required to pay the tuition fee for the course.

Resources for Students:

- UVic Learn Anywhere
- Library resources
- Indigenous Student Services (ISS)
- Centre for Academic Communication (CAC)
- Math & Stats Assistance Centre
- Learning Assistance Program (LSP)
- Community-Engaged Learning (CEL)
- Academic Concessions Regulation
- Academic Concessions & Accomodations
- Centre for Accessible Learning (CAL)
- Academic Accommodation & Access for students with disabilities - Policy AC1205
- Student Groups & Resources
- Student Wellness
- Office of the Ombudsperson

University Statements and Policies:

- Information for all students
- Attendance
- Creating a respectful, inclusive and productive learning environment (general policies)
- Accommodation of Religious Observance
- Student Conduct
- Academic Integrity
- Non-academic Student Misconduct
- Standards of Professional Behaviour (Faculty of Engineering and Computer Science)
- Academic Accommodations and Accessibility
- Accessibility
- Diversity & Inclusion Supports (Faculty of Engineering and Computer Science)
- Diversity / EDI (VPAC's Commitment
- Equity statement
- Sexualized Violence Prevention and Response
- Discrimination and Harassment Policy