COURSE OUTLINE

Instructor: Dr. T. Aaron Gulliver

Office: EOW 325
Telephone: 721-6028
Email: agullive@ece.uvic.ca
Office Hours: Tuesday 11:30 – 1:30

Lectures

Tuesday 10:30 – 11:20 ECS 108
Wednesday 10:30 – 11:20 ECS 108
Friday 10:30 – 11:20 ECS 108

Web Site: http://www.ece.uvic.ca/~agullive/405.html

Textbook

Stephen Wicker, Error Control Systems for Digital Communication and Storage
Available from the bookstore as a print on demand (POD) text.

Assessment

Five Assignments 30%
Midterm Test 20%  Friday, February 19, 2016
Final Exam 50%

Assignments

Each Assignment is worth 6% of the final grade. No marks or credit will be given for assignments handed in after the due date. Completed assignments can be delivered to EOW 325 or submitted at lecture time.

Course Description

The channel coding problem; error control in data storage and transmission systems; groups, rings and fields; irreducible and primitive polynomials; vector spaces and matrices; linear block codes: generator and parity check matrices; Hamming codes and the Hamming bound; coding bounds and dual codes; syndrome decoding; polynomial rings and cyclic codes; encoding and decoding of cyclic codes; BCH and Reed-Solomon codes; convolutional codes and the Viterbi algorithm

Learning Outcomes

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

- Explain the need for error correction in data communication and storage systems.
- Apply mathematical tools from group and finite field theory in the design of codes.
- Design an error correcting code for a given application.
- Describe the fundamental limits of error correction.
- Demonstrate the decoding of block codes including cyclic codes.
- Explain the operation of a convolutional encoder.
- Apply the Viterbi algorithm to decode a convolutional code.
Syllabus

Week(s)          Lecture

1              Course introduction; The channel coding problem [Chap. 1]
2-3            Vector spaces; Linear block codes [Chap. 4]
4-6            Groups, rings and fields; Primitive and irreducible polynomials [Chap. 2]
7-9            Polynomial rings and cyclic codes [Chaps. 3,5]
10-11          BCH and Reed-Solomon codes [Chaps. 8-9]
12-13          Convolutional codes and the Viterbi algorithm [Chaps. 11-12]

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.

There will be no supplemental examination for this course.

http://web.uvic.ca/calendar/FACS/UnIn/UARe/Grad.html

Note to Students

Students who have issues with the conduct of the course should first discuss them with the instructor. If these discussions do not resolve the issue, students should feel free to contact the Chair of the Department by email or the Assistant to the Chair to set up an appointment.

Accommodation of Religious Observance

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

Policy on Inclusivity and Diversity

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, which contains important information regarding conduct in courses, labs, and in the general use of facilities.

http://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 the entry in the current Undergraduate Calendar for the UVic policy on academic integrity.

http://web.uvic.ca/calendar/FACS/UnIn/UARe/PoAcI.html

Course Materials

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.