COURSE OUTLINE

Instructor: Dr. T. Aaron Gulliver
Office: EOW 323
Telephone: 721-6028
Email: agullive@ece.uvic.ca
Office Hours: Tuesday 12:30 – 2:30

Lectures
Tuesday 11:30 – 12:20 ELL 161
Wednesday 11:30 – 12:20 ELL 161
Friday 11:30 – 12:20 ELL 161

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 21, 2014
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 323 or submitted at lecture time.

Course Description
Communication channels and the coding problem; 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; sequence design for spread spectrum communications

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 groups and finite fields in the design of codes and sequences.
- 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.
- Explain the use of sequences in digital communications.
Syllabus

Week(s) Lecture

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

The final grade obtained from the above marking scheme will be based on the following percentage-to-grade point conversion:

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<th>Passing Grades</th>
<th>Grade Point Value</th>
<th>Percentage for Instructor Use Only</th>
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<td>90-100</td>
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<td>8</td>
<td>85-89</td>
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<td>80-84</td>
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<tr>
<td>B+</td>
<td>6</td>
<td>77-79</td>
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<td>B</td>
<td>5</td>
<td>73-76</td>
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<td>B-</td>
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<td>70-72</td>
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<table>
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Fail, conditional supplemental exam.
Fail, no supplemental exam.
Fail, did not write examination or otherwise complete course requirements by the end of the term or session; no supplemental exam.

The rules for supplemental examinations are found on page 80 of the current 2013/14 Undergraduate Calendar. For courses taken in January-April, the application deadline for a supplemental exam is June 30 in the following term. The supplemental exam date will be in the first week of the following September. Deferred exams will normally be written at the start of the student’s next academic term, i.e., approximately 4 months following the deferral of the exam.

Accommodation of Religious Observance

See http://web.uvic.ca/calendar2013/GI/GUPo.html

Policy on Inclusivity and Diversity

See http://web.uvic.ca/calendar2013/GI/GUPo.html

Standards of Professional Behaviour

You are advised to read the Faculty of Engineering document Standards for Professional Behaviour at http://www.uvic.ca/engineering/current/undergrad/index.php#section0-25 which contains important information regarding conduct in courses, labs, and in the general use of facilities.

Cheating, plagiarism and other forms of academic fraud are taken very seriously by both the University and the Department. You should consult http://web.uvic.ca/calendar2013/FACS/UnIn/UARe/PoAcI.html for the UVic policy on academic integrity.