ECE405: Error Control Coding

Course Dates

<table>
<thead>
<tr>
<th>CRN(s):</th>
<th>Section A01 CRN: 20957</th>
</tr>
</thead>
<tbody>
<tr>
<td>Term:</td>
<td>2023</td>
</tr>
<tr>
<td>Course Start:</td>
<td>2023-01-09</td>
</tr>
<tr>
<td>Course End:</td>
<td>2023-04-09</td>
</tr>
<tr>
<td>Withdrawal with 100% reduction of tuition fees:</td>
<td>2023-01-22</td>
</tr>
<tr>
<td>Withdrawal with 50% reduction of tuition fees:</td>
<td>2023-02-12</td>
</tr>
<tr>
<td>Last day for withdrawal (no fees returned):</td>
<td>2023-02-28</td>
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Cross-listed With

Cross-Listed Course(s): ECE511

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

<table>
<thead>
<tr>
<th>Section:</th>
<th>Location:</th>
<th>Classes Start:</th>
<th>Classes End:</th>
<th>Days of week:</th>
<th>Hours of day:</th>
<th>Instructor:</th>
</tr>
</thead>
<tbody>
<tr>
<td>A01</td>
<td>ECS 130</td>
<td>2023-01-09</td>
<td>2023-04-06</td>
<td>TWF</td>
<td>10:30-11:20</td>
<td>Aaron Gulliver</td>
</tr>
</tbody>
</table>

Instructor(s)

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

Office Hours: Comments
Wed 12:30pm-02:30pm

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 a convolutional encoder.
6. Apply the Viterbi algorithm to decode a convolutional code.

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
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.
provide feedback on an appeal, investigate and make recommendations. Phone: 250-721-8357. Email: ombuddy@uvic.ca. Web: https://uvicombudsperson.ca/.

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