ECE 7250– INFORMATION THEORY AND APPLICATIONS
COURSE OUTLINE – FALL 2019

COURSE DESCRIPTION: This course covers the basic concepts in Shannon’s information theory which form the mathematical basis for analysis and design of communication and information processing systems.

COURSE OBJECTIVE: Information theory deals with the ‘‘laws of nature’’ governing the transmission, storage, and processing of information. It establishes fundamental limits imposed by nature that no communication system can exceed, and provides clues on how to design systems which can approach these limits. The objective of this course is to understand such fundamental results and their implications in engineering of communication systems and other information processing systems.

PRE-REQUISITES: Basic probability theory, random variables and processes, and an undergraduate level signal processing background.

CONTACT HOURS: 3 lecture hours/week

COURSE CONTENT: Measures of information for discrete sources, lossless source coding and Shannon’s source coding theorem, capacity of noisy channels and Shannon’s channel coding theorem, generalization to continuous sources, Gaussian channel, fading channels, lossy source-coding and rate-distortion theory, universal source-coding (time permitting)

HOMEWORK: Assignments to be handed-in for marking and grading.


EVALUATION:
Your final course grade is determined by your performance in assignments, term test, and a final examination. The weighting of each of these components is as follows:

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<th>COMPONENT</th>
<th>NO</th>
<th>VALUE %</th>
<th>TOTAL VALUE</th>
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<tbody>
<tr>
<td>Homework/Assignments</td>
<td>6</td>
<td>30%</td>
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<tr>
<td>Project</td>
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<td>20%</td>
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<tr>
<td>Final Examination</td>
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<td>TOTAL</td>
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INSTRUCTOR INFO:
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Office Hours: TBD
VOLUNTARY WITHDRAW:

18 November 2019

REQUIREMENTS/REGULATIONS

- **Student Responsibilities:** It is the responsibility of each student to contact the instructor if he/she is uncertain about his/her standing in the course and about his or her potential for receiving a failing grade. Students should also familiarize themselves with Sections 4 and 6 of the Regulations dealing with incomplete term work, deferred examinations, and attendance and withdrawal.
  - **Lectures:** Attendance at lectures is essential for successful completion of this course. Students must satisfy each evaluation component in the course.

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 and Requirements of the University of Manitoba, Section 7.1, students are reminded that plagiarism* or any other form of cheating is subject to serious academic penalty (e.g. suspension or expulsion from the faculty or university) regardless of media

  - examinations
  - assignments
  - laboratory reports
  - term exams

A student found guilty of contributing to cheating in examinations or term assignments is also subject to serious academic penalty

* **Plagiarism:** to steal and pass off (the ideas or words of another) as one's own; use (another's production) without crediting the source