FALL 2021 — ECE 7250 – INFORMATION THEORY AND APPLICATIONS

COURSE DESCRIPTION:

The course covers the basic concepts in Shannon's information theory that 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 that 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-hours per week

COURSE CONTENT:

Measures of information for discrete sources; lossless source coding and Shannon's source coding theorem; capacity of noisy channels and channel coding theorem; generalization to continuous sources, Gaussian channel, fading channels; lossy source-coding and rate-distortion theory; maximum entropy principle (time permitting)

HOMEWORK:

Assignments (analytical problems and Matlab exercises) to be handed-in for marking and grading.

TEXTBOOK:

T. M. Cover and J. A. Thomas, *Elements of Information Theory*, Second Edition, John Wiley & Sons, 2006

GRADE ANNOUNCEMENTS:

   Grades for this course will be announced by January 2021

EVALUATION:

   Your final course grade is determined by your performance in the components listed below in the Evaluation Table. Students must receive a minimum of 50% on the final examination and must complete and pass all components in the course in order to be eligible to receive a passing grade.

   Each component is weighted as follows:

COMPONENT	NO	VALUE %	TOTAL VALUE	DETAILS / ADDITIONAL INFO
Assignments	6	50%	50	
Final Examination	1	50%	50	
TOTAL			100	

==GRADE SCALE:==

LETTER	MARK	LETTER	MARK	LETTER	MARK	LETTER	MARK
A+	95-100	B+	80-84	C+	65-69	D	45-54
A	85-94	B	70-79	C	55-64	F	<45

INSTRUCTOR INFO:

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Office Hours: .... By appointment

VOLUNTARY WITHDRAW:

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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 his/her potential for receiving a failing grade. Students should also familiarize themselves with Sections 4 and 6 of the Regulations dealing with, among others, incomplete term work, deferred examinations, attendance and withdrawal, etc..

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

Please refer any questions regarding Academic Integrity to your course instructor.

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