



FALL 2017

ECE 7440 – Advanced Signal Processing

COURSE OBJECTIVE:

Signal Processing is an area of applied mathematics that deals with analysis of signals to perform useful operations on those signals. The objective of this course is to understand fundamental signal representations and algorithms for signal analysis and information extraction.

PRE-REQUISITES:

Undergraduate courses on Linear Algebra & Digital Signal Processing.

CONTACT HOURS:

3-hours per week – 1 Lecture weekly

COURSE CONTENT:

The following topics will be discussed:

- - Linear signal spaces
- - Projection theorem & orthogonality principle
- - Linear operators and their inverses
- - Frame theory
- - Sparse least squares
- - Sparse signal processing

Additional advanced research topics as determined by the instructor.

HOMEWORK:

Homework will consist of assignments, preparation of a seminar on an assigned article from the research literature, and an individual design project.

TEXTBOOK:

- Mathematical Methods & Algorithms for Signal Processing by Moon & Stirling (Prentice Hall, 1999)
- A Wavelet Tour of Signal Processing, Third Edition: The Sparse Way by Stephane Mallat, (AP 2008)

RECOMMENDED REFERENCE BOOKS

- Signal Theory by L. E. Franks (Prentice-Hall, 1969)
- Statistical Learning with Sparsity: The Lasso and Generalizations by Hastie, Tibshirani & Wainwright (Chapman & Hall 2015)

EVALUATION:

Your final course grade is determined by your performance in assignments, a course project, midterm exam, and a final exam. The weighting of each of these components is as follows:

COMPONENT	NO	VALUE %	TOTAL VALUE	DETAILS / ADDITIONAL INFO
Project	1	10%	10	
Assignments	5	2%	10	
Midterm Exam	1	30%	30	
Final Exam	1	50%	50	
TOTAL			100	

INSTRUCTOR INFO:

Name: Sherif Sherif
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Office Hours: By appointment

VOLUNTARY WITHDRAW:

Friday, 17 November 2017

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