

FALL 2026**ECE 7440 (T04) – Advanced Signal Processing****COURSE DESCRIPTION:**

Signal Processing is an area of applied mathematics to perform useful operations on those signals. e.g., signal analysis and information extraction.

COURSE OBJECTIVE:

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

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 analytical or computer-based assignments.

TEXTBOOKS:

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

GRADE ANNOUNCEMENTS:

Grades for this course will be announced by Jan 2026

EVALUATION:

Your final course grade is determined by your performance in the components list below in the Evaluation Table (seminar, assignments, project, mid-term, and a final examination. 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
Seminars	0	0%	0	
Assignments	5	2%	10	
Project	1	10%	10	
Mid-Term Exam	1	30%	30	
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:

November 24, 2026

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

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 on Academic Integrity, students are reminded that plagiarism* or any other form of cheating in examinations, term tests, assignments, projects, or laboratory reports is subject to serious academic penalty (e.g. suspension or expulsion from the faculty or university). **This includes the unauthorized use of AI when preparing course deliverables.** A student found guilty of contributing to cheating by another student is also subject to serious academic penalty. **Integrity also applies to respecting copyrighted course content, which should not be distributed without the creator's permission. Uploading content for the purpose of transcription or other AI-enabled features is commonly a violation of the copyright holder's rights.**

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