

EE5410: SIGNAL PROCESSING

Effective Term

Semester A 2025/26

Part I Course Overview

Course Title

Signal Processing

Subject Code

EE - Electrical Engineering

Course Number

5410

Academic Unit

Electrical Engineering (EE)

College/School

College of Engineering (EG)

Course Duration

One Semester

Credit Units

3

Level

P5, P6 - Postgraduate Degree

Medium of Instruction

English

Medium of Assessment

English

Prerequisites

Nil

Precursors

EE3008 Principles of Communications or EE3112 Signal Analysis or EE3210 Signals and Systems; or equivalent.

Equivalent Courses

Nil

Exclusive Courses

EE4015 Digital Signal Processing

Part II Course Details

Abstract

The aim of this course is to provide students with a solid foundation in signal processing, and to facilitate students to solve real-world problems by signal processing techniques.

Course Intended Learning Outcomes (CILOs)

CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Recognize properties of continuous-time and discrete-time signals and systems.	x		
2	Explain the relationship among different transforms in signal processing.	x		
3	Analyse discrete-time systems and calculate system parameters using appropriate transforms.	x	x	
4	Design and realize digital filters.	x	x	
5	Apply signal processing techniques for solving science and engineering problems.	x	x	x

A1: Attitude

Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability

Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to real-life problems.

A3: Accomplishments

Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

Learning and Teaching Activities (LTAs)

LTAs	Brief Description	CILO No.	Hours/week (if applicable)
1	Lecture	Fundamental concepts of signal processing are described and demonstrated.	1, 2, 3, 4
2	Work-along examples, in-class exercise	Key concepts are worked out based on questions and problem solving	1, 2, 3, 4
3	Mini-projects	Mini-projects in terms of exercises (e.g. based on MATLAB) are designed for students to apply the knowledge learned from the course to tackle real-world problems.	3, 4, 5
4	Assignments	Standard assignments are used for consolidating the concepts and knowledge learned from the course.	1, 2, 3, 4

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks ("- for nil entry)	Allow Use of GenAI?
1	Tests (min.: 2)	1, 2, 3, 4, 5	30	-	No
2	#Assignments (min.:3)	1, 2, 3, 4, 5	20	-	Yes

Continuous Assessment (%)

50

Examination (%)

50

Examination Duration (Hours)

2

Additional Information for ATs

Remark: To pass the course, students are required to achieve at least 30% in course work and 30% in the examination. # may include homework, tutorial exercise, project/mini-project, presentation

Assessment Rubrics (AR)**Assessment Task**

Examination (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion

Achievements in CILOs

Excellent

(A+, A, A-) High

Good

(B+, B, B-) Significant

Fair

(C+, C, C-) Moderate

Marginal

(D) Basic

Failure

(F) Not even reaching marginal level

Assessment Task

Coursework (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion

Achievements in CILOs

Excellent

(A+, A, A-) High

Good

(B+, B, B-) Significant

Fair

(C+, C, C-) Moderate

Marginal

(D) Basic

Failure

(F) Not even reaching marginal level

Assessment Task

Examination (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion

Achievements in CILOs

Excellent

(A+, A, A-) High

Good

(B+, B) Medium

Marginal

(B-, C+, C) Low

Failure

(F) Not even reaching marginal level

Assessment Task

Coursework (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion

Achievements in CILOs

Excellent

(A+, A, A-) High

Good

(B+, B) Medium

Marginal

(B-, C+, C) Low

Failure

(F) Not even reaching marginal level

Additional Information for AR

Constructive Alignment with Programme Outcomes

PILO 1,2,3 - The course provides students with ample opportunities in acquiring knowledge of signal processing as well as applications of mathematics and engineering problem solving skills, which are central to the aims of this program.

PILO 4,5 - Students are required to complete assignments designed to apply signal processing techniques for solving real-world problems. The analytical and research skills developed are central to the aims of this program.

Part III Other Information**Keyword Syllabus**Analog and Digital Signal Analysis

Analog Signal Analysis, Sampling and Reconstruction of Continuous-Time Signals, z-Transform, Fourier Transform of Discrete-Time Signals, Discrete Fourier Transform, Fast Fourier Transform.

Design and Implementation of Digital Filters

Linear Time-Invariant Systems and Transform Analysis, Structure for Discrete-Time Systems, Design of Finite Impulse Response and Infinite Impulse Response Filters, Implementation Considerations.

Selected Topics

Encoding and Decoding, Estimation Theory, Optimal and Adaptive Filtering, Signal Detection, Spectral Analysis

Reading List**Compulsory Readings**

Title	
1	Course materials at the departmental Web.

Additional Readings

Title	
1	H. C. So Digital Signal Processing: Foundations, Transforms and Filters, with Hands-on MATLAB Illustrations McGraw-Hill, 2010
2	A.V. Oppenheim and R.W. Schaffer, Discrete-Time Signal Processing 3rd Edition, Pearson 2009
3	V.K. Ingle and J.G. Proakis, Digital Signal Processing Using MATLAB 4th Edition, Cengage Learning, 2016
4	S. K. Mitra, Digital Signal Processing: A Computer-Based Approach, 4th Edition, McGraw-Hill, 2011
5	J. G. Proakis and D. G. Manolakis, Digital Signal Processing: Principles, Algorithms and Applications, 4th Edition, Prentice-Hall, 2007
6	S. Haykin, Adaptive Filter Theory, 5th Edition, Pearson, 2014