

# ENG311e Digital Signal Processing

**Level:** 3

**Credit Units:** 5 Credit Units

**Language:** ENGLISH

**Presentation Pattern:** EVERY JULY

**E-Learning:** BLENDED - Learning is done MAINLY online using interactive study materials in Canvas. Students receive guidance and support from online instructors via discussion forums and emails. This is supplemented with SOME face-to-face sessions. If the course has an exam component, this will be administered on-campus.

## Synopsis:

This course aims to equip students with the basic concepts and knowledge in Digital Signal Processing covering analytical and design concepts, methods and considerations for practical implementation. In the first part of this course, the main characteristics of discrete signals, properties of linear time invariant systems (LTI), z-transform and its properties, and frequency analysis of discrete-time signal are introduced. In the second part of this course, discrete time Fourier transform and realization of digital filters are presented. Design of FIR (Finite Impulse Response) and IIR (Infinite Impulse response) filters will be treated in the last part of this course.

Besides being theoretical on the analytical skill set & methodology, student will also be given the opportunity to work on Industrial well-known Signal Processing Tools in lab session , such as MATLAB (and/or with real Target Digital Signal Processor).

## Topics:

- Discrete Time Signal & Systems
- The z-transform
- Discrete Fourier Transform
- Realization of Digital Filters
- FIR Filter Design
- IIR Filter Design

## Textbooks:

Proakis, J.G., Manolakis, D. G. : Digital Signal Processing, Principles, Algorithms, and Application (eTextbook) 4th Edition Pearson New International Edition  
ISBN-13: 9781292038162-AA

: Digital Signal Processing, Principles, Algorithms, and Applications (eText version)  
ISBN-13: 9789814514132

: Digital Signal Processing, Principles, Algorithms, and Applications (eText version)  
ISBN-13: 9789814514132-AA

Proakis, J.G., Manolakis, D. G. : Digital Signal Processing, Principles, Algorithms, and Application (eTextbook) 4th Edition Pearson New International Edition  
ISBN-13: 9781292038162

**Learning Outcome:**

- Discuss the properties of Linear Time-Invariant (LTI) systems.
- Calculate sampling frequency, circular convolution, quantization parameters and other signal parameters.
- Analyze LTI systems and signals in the time and frequency domains.
- Apply the properties of Fourier methods (Fourier Series, Fourier Transform, Discrete Fourier Transform) to examine signals and systems.
- Implement Finite Impulse Response Filters (FIR) using windowing, frequency-sampling and optimal equi-ripple methods.
- Construct Infinite Impulse Response Filters (IIR) using either Impulse Invariance or the Bilinear Transformation.
- Formulate algebraic expressions to represent signals and systems.
- Draw the block diagrams, impulse response, magnitude response, phase response and other characteristics of signals / systems.

**Assessment Strategies:**

<b>Continuous Assessment Component</b>	<b>Weightage (%)</b>
CLASS TEST	8
CLASS TEST	8
LAB TEST	8
PRE-CLASS QUIZ	2
PRE-CLASS QUIZ	2
PRE-CLASS QUIZ	2
<b>Sub-Total</b>	<b>30</b>

<b>Examinable Component</b>	<b>Weightage (%)</b>
Written Exam	70
<b>Sub-Total</b>	<b>70</b>

**Weightage Total** **100**