



# Jahangirnagar University

## Institute of Information Technology

### Course outline

**Course Code:**

**ICT-4103**

**Course Title:**

**Digital Signal Processing**

**Credit Hours:**

**3.0 hours**

**Course Level:**

**4<sup>th</sup> Year 1<sup>st</sup> Sem.**

**Course Teacher**

**Md. Biplob Hosen**

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**Course objective:**

The objective of this course is to:

- Develop the knowledge of signals used in digital signal processing.
- Introduce signals, systems, time and frequency domain concepts, and the associated mathematical tools that are fundamental to all DSP techniques.
- Provide a thorough understanding and working knowledge of design, implementation, analysis, and comparison of digital filters for processing of discrete-time signals.
- Study various sampling techniques and different types of filters and will also understand the basic principles of Estimation Theory.

**Course Learning Outcomes (CLOs):**

Upon completion of the course, students will be able:

- CLO1- To understand the classification of Signals and their operations
- CLO2- To construct digital systems and explain different types of transformation on a signal.
- CLO3- To analyze the discrete-time signals and systems in the frequency domain using Discrete Fourier Transform and Fast Fourier Transform.
- CLO4- To design FIR and IIR filters using a variety of techniques.

**Textbook:**

- Digital Signal Processing: Principles, Algorithms and Applications, 4<sup>th</sup> Edition by John G. Proakis & Dimitris G. Manolakis.

**Reference Books:**

- A Textbook of Digital Signal Processing, 1st Edition by Dr. Sanjay Sharma.

**Lesson Plan:**

<u>Week</u>	<u>Contents</u>
1	Introduction to DSP, Applications of DSP, Advantages and limitations of DSP, Classification of signals, Sampling, Analog to Digital Conversion.
2	DSP Operations: Convolution, Correlation, Digital filtering, Discrete transformation, and modulation.

3	Classification of DT signals & DT systems, Implementation of discrete-time systems, <b>CT-01</b>
4	Z-Transform.
5	Frequency analysis of LTI systems.
6	Sampling and reconstruction of signals
7	Discrete-Time Fourier Transform, <b>CT-02.</b>
8	Fast Fourier Transform.
9	Implementation of discrete-time systems.
10	Impulse response, FIR and IIR, <b>CT-03.</b>
11	Digital filter: advantages and limitations, Design of digital filters.
12	Linear prediction and optimum linear filters.
13	Adaptive filters.
14	<b>Presentation</b> & Review Class.

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