

## ECE328: Digital Signal Processing and Communication Lab

Programme: B. Tech. (ECE and CCE)  
Course : Core for ECE and CCE

Year: 3<sup>rd</sup>  
Credits: 2

Semester: I  
Hours: 30

### Course Context and Overview (100 words):

The objective of the course is that student would appreciate the significance of signal processing in different applications and fundamental of communications. Understand and analyze the various blocks of commutation system. They would be able to feel the importance of signal processing and communication in daily life. They would be also able to implement different application systems (in communication and signal processing) using MATLAB and Hardware.

**Prerequisites Courses:** Principles of Communication & Signal, Systems and Control

### Course Outcomes (COs):

| On completion of this course, the students will have the ability to:  |
|---|
| CO1: Apply basic math, science, and engineering to process signals analytically and numerically using MATLAB. |
| CO2: Write MATLAB codes to characterize sampled systems in time and frequency domain.                         |
| CO3: Design, analyze, and implement digital filters in MATLAB.  |
| CO4: Analyze and design various communication system blocks.  |
| CO5: Analyze and implement the DCT compression techniques.  |

### Course Topics:

| Topics   | Lab Sessions | Hours |
|--|--------------|-------|
| <b>UNIT - I</b>  |              |       |
| <b>1. Topic</b> Signal Processing  | 3            | 9     |
| 1.1 Analysis and implementation of uniform and non uniform quantization in MATLAB                        | 1            |       |
| 1.2 Implementation of linear and circular convolution and DFT as matrix vector multiplication in MATLAB. | 1            |       |
| 1.3 Application of DFTs.   | 1            |       |
| <b>UNIT - II</b>   |              |       |
| <b>2. Topic</b> Application of Signal Processing   | 2            | 6     |
| 2.1 Implementation of image compression using the DCT in MATLAB.   | 1            |       |

|   |   |    |
|---|---|----|
| 2.2 Analysis and implementation of multirate signal processing in MATLAB.                   | 1 |    |
| <b>UNIT - III</b>   |   |    |
| <b>3. Topic Digital Communication</b>   | 5 |    |
| 3.1 Hardware implementation and analysis of Delta modulation and demodulation.              | 1 | 15 |
| 3.2 Hardware implementation and analysis of various line codes i.e. RZ, NRZ, and Manchester | 1 |    |
| 3.3 Hardware implementation and analysis of BPSK modulation and demodulation                | 1 |    |
| 3.4 Hardware implementation and analysis of matched filter receiver.                        | 1 |    |
| 3.5 Hardware implementation and analysis of FSK modulation and demodulation                 | 1 |    |

**Text Books:**

1. Proakis et al., “*Digital Signal Processing: Principles Algorithms and Applications*”, Prentice Hall, 4<sup>th</sup> Ed. 2007.
2. Papoulis et al., “*Probability, Random Variables and Stochastic Processes*”, McGraw Hill, 3<sup>rd</sup> Ed.
3. B. P. Lathi, “*Modern Digital and Analog Communication System*”, Oxford University Press, 3<sup>rd</sup> Ed.

**Evaluation Methods:**

| Item                 | Weightage |
|----------------------|-----------|
| Lab Evaluations      | 40        |
| Viva-voce            | 20        |
| End-term Examination | 40        |