Course Title	**Digital Signal Processing**
Course Code	**EE5402**
No. of Credit Hrs (Lecture + Tutorial + Lab)	**4 (3+0+1)**
No. of Contact Hrs (Lecture + Tutorial + Lab)	**5 (3+0+2)**
Level-Year	**10-4**
Prerequisite (if any)	**EE3302, MATH2303**

1) Course Objectives:

The course is designed to introduce the students to the representation of signals and systems in time and frequency domains. This course will cover the mathematical tools fundamental to all DSP techniques. Moreover, it discusses the design, analysis and implementation of DSP systems. A practical knowledge of digital signal processing will be provided.

2) Expected Learning Outcomes:

Upon completion of this course, the students should be able to:

1. **Recognize and explain** the fundamental concepts of signals in time and frequency domains. **PLO1 [1]**
2. **Apply DSP techniques** to process signals, including sampling, quantization, down-sampling, and up-sampling. **PLO1 [1]**
3. **Perform and analyze** discrete-time Fourier transform (DTFT), discrete Fourier transform (DFT), and fast Fourier transform (FFT) operations. **PLO3 [6]**
4. **Illustrate and compare** DSP processor architectures and differentiate between types of commercially available DSP chipsets. **PLO3 [6]**
5. **Employ software and hardware tools** to design, implement, and test DSP systems and operations such as convolution and filtering (FIR, IIR). **PLO2 [2]**
6. **Communicate and collaborate** effectively by preparing technical reports and working in teams. **PLO8 [3]**

3) Course Contents:

1. Review of discrete-time signals and systems
2. Discrete-Time Fourier Transform and Linear Time Invariant Systems
3. Z-Transform,
4. Discrete Fourier transform and Fast Fourier Transform.
5. Linear and circular convolutions
6. FIR and IIR digital filters design and realization;
7. Decimation and interpolation;
8. Applications of digital signal processing in communications.

4) DSP Lap Contents:

I. MATLAB-based experiments

1. Generation of sequences and test some operations as correlation, sampling and effect of aliasing and linear and circular convolutions
2. Spectrum analysis using DFT

3. FIR and IIR filter design and Implementation

II. DSP processor-based experiments: using DSPCHIP- TMS3 [2,7]20C5515 to:

1. Study of architecture of digital signal processor
2. Waveform generation and implementation of linear and circular convolution
3. FFT implementation
4. IIR and FIR implementation

7. Teaching Methods:

- Lectures and Discussion
- Videos
- Self-learning
- Laboratory demonstrations

8. Mode of Evaluation: Course Assessment Methods

- Quizzes , Assignment, Homeworks, Reports, Presentations etc.
- Lab Work
- Mid Exam
- Final Exam

Evaluation

No	Assessment Activities *	Percentage
1.	Assignments/Quizzes/HomeWorks/Mini-Projects/Presentations/Reports+Quizzes	15%
2.	Mid Exam	25%
3.	Lab/Tutorial (Lab Exam)	10%
4.	Lab/Tutorial (Lab Reports)	10%
5.	Final Exam	40%

9. Textbook(s):

- Discrete time signal processing By Alan V. Oppenheim, Ronald, W Schafer, John R. Buck, 2nd edition, Pearson Education.
- Lab Manual

10. References:

- Digital Signal Processing – a computer-based approach By, Sanjit K. Mitra and YonghongKuo, 2nd edition, McGraw Hill