

- William Lee, “Wireless & Cellular Communication”, McGraw-Hill, Latest Edition
- Andrea Goldsmith, “ Wireless Communication”, Latest Edition
- Morvin K. Simon & Slim Alouini, “ Digital Communication over Fading Channels” Latest Edition

DIGITAL SIGNAL PROCESSING

Contact Hours:

Theory = 48
 Practical = 48
 Total = 96

Credit Hours:

Theory = 3.0
 Practical = 1.0
 Total = 4.0

SUGGESTED COURSE LEARNING OUTCOMES:

Upon successful completion of the course, the student will be able to:

Ser	Example CLO	Domain	Taxonomy level	PLO
1.	ANALYSE and evaluate the properties of LTI systems in terms of its z-transforms.	Cognitive	4	1
2.	UNDERSTAND the sampling theorem and perform sampling on continuous-time signals.	Cognitive	2	2
3.	APPLY the concepts of all-pass and minimum-phase systems to analyze the LTI system and address complex design problems.	Cognitive	3	5
4.	EVALUATE design problems related to frequency selective processing and design FIR/IIR filters.	Cognitive	3	3
5.	CONSTRUCT systems for spectral estimation of real signals.	Psychomotor	3	2

RELEVANT PROGRAM LEARNING OUTCOMES (PLOs):

The course is designed so that students will achieve the following PLOs:

1	Engineering Knowledge:	<input checked="" type="checkbox"/>	7	Environment and Sustainability:	<input type="checkbox"/>
2	Problem Analysis:	<input checked="" type="checkbox"/>	8	Ethics:	<input type="checkbox"/>
3	Design/Development of Solutions:	<input checked="" type="checkbox"/>	9	Individual and Team Work:	<input type="checkbox"/>
4	Investigation:	<input type="checkbox"/>	10	Communication:	<input type="checkbox"/>
5	Modern Tool Usage:	<input checked="" type="checkbox"/>	11	Project Management:	<input type="checkbox"/>
6	The Engineer and Society:	<input type="checkbox"/>	12	Lifelong Learning:	<input type="checkbox"/>

Course outline:

- Review of Signals & Systems: Discrete LTI systems, Convolution, Difference Equations.
- z-transforms
- Sampling of Continuous Time Signals: Basic principles, Changing sampling rate, Pre-filtering to avoid aliasing, Quantization errors.
- Transform Analysis of LTI Systems

- Frequency response of LTI systems, All pass systems, Minimum phase systems.
- IIR & FIR Filters and Filter Design Techniques
- Discrete Time Fourier Transform (DFT) and FFT Algorithms
- Fourier Analysis of Real Signals with DFT

Practical:

- Implementation of FIR and IIR filter
- Signal detection
- Equalizer implementation
- Channel Estimation

Teaching Methodology

- Lectures
- Laboratory work
- Projects

Assessment

Sessional + Mid Term

- Written (Long Questions, Short Questions, MCQs)
- Presentation
- Assignments
- Report Writing

Final Term

- Written (Long Questions, Short Questions, MCQs)
- Presentation
- Report Writing

Text and Reference books:

- A.V. Oppenheim, R.W. Schafer and J.R. Buck, Discrete-Time Signal Processing, 3rd Edition, Pearson Education, 2009.
- S.K. Mitra, Digital Signal Processing: A Computer Based Approach, McGraw-Hill, 2011.
- J.G. Proakis and D. Manolakis, Digital Signal Processing: Principles, Algorithms and Applications, Prentice-Hall, 2007.
- Li Tan, Digital Signal Processing Fundamentals and Applications, Academic Press, Elsevier, ISBN: 978-0-12-374090-8