Lecture Plan for EEE 311 (Digital Signal Processing)

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Office: EE 624 **Class Room:** EE 311
Period: Monday 9:00 am – 11:00 am & Wednesday 8:00 am – 9:00 am

Text:
Digital Signal Processing – Principles, Algorithms, and Applications
By John G. Proakis and Dimitris G. Manolakis (3rd Ed)

OUTLINE OF THE LECTURES

Week	Topics	Section(s) in Text
1	L-1: Signals, Systems, and Signal Processing, Classification of Signals	1.1,1.2
	L2:The Concept of Frequency in Discrete-Time (DT) Signal	1.3
	L3: A/D & D/A Conversion, Sampling Theorem, Related Problems.	1.4
2	L1: Representation, Classification, and Manipulation of DT Signals.	2.1
	L2: I/O Description of DT Systems. Block Diagram of DT Systems	2.2.1,2.2.2
	L3: Classification and Properties of DT Systems	2.2.3,2.2.4
3	L1: Analysis of DT-LTI Systems: Resolution of DT Signals into Impulses, Convolution Sum, Examples	2.3.1,2.3.2,2.3.3
	L2: Properties of Convolution and Interconnections of LTI Systems	2.3.4
	L3: Causality and Stability of LTI System. FIR and IIR Systems	2.3.5,2.3.6,2.3.7
4	L1: I/O Representation Using Difference Equation. Recursive and Nonrecursive DT Systems	2.4.1
	L2: Solution of Constant Coefficient Difference Equation for LTI System	2.4.2,2.4.3
	L3: Impulse response of LTI Recursive System. Realization of LTI System	2.4.4,2.5
5	L1: Correlation of DT signals. Properties of Aotu- and Cross-Correlations.	2.6.1,2.6.2
	L2: Correlation of Periodic Signals, Computation of Correlation Sequences	2.6.3,2.6.4,2.6.5
	L3: Z-Transform and ROC	3.1
6	L1: Properties of Z-Transform	3.2
	L2: Rational Z-Transform. Pole-Zero Locations and Time-Domain Behavior.	3.3.1,3.3.2
	L3: System Function of LTI System	3.3.3

7	L1: Inverse Z-Transform	3.4
	L2: Solutions of Difference Equation	3.5
	L3: Analysis of Z-Transform for LTI System (e.g., Stability)	3.6
8	L1: Frequency Analysis of DT Signal: DT Fourier Series	4.2.1,4.2.2
	L2: DT Fourier Transform: Energy Spectrum	4.2.3,4.2.4,4.2.5
	L3: Relation between Fourier and Z-Transform, Cepstrum	4.2.6,4.2.7
9	L1: Properties of Fourier Transform	4.3
	L2: Frequency-Domain Characteristics of LTI System	4.4
	L3: Digital LPF, HPF, BPF, Resonators	4.5.2,4.5.3
10	L1: Notch Filters, Comb Filters, All-Pass Filters	4.5.4,4.5.5,4.5.6
	L2: Inverse System and Deconvolution	4.6
	L3: Frequency-Domain Sampling: DFT	5.1
11	L1: Properties of DFT	5.2
	L2: Frequency Analysis of Signals Using DFT, FFT	5.4,6
	L3: Digital Filter Design: General Consideration	8.1
12	L1: Design of FIR Filter Using Frequency-Sampling Method	8.2.3
	L2: Design of FIR Filter Using Windows	8.2.1
	L3: Design of Equiripple FIR Filter	8.2.4
13	L1: Design of FIR Differentiators and Hilbert Transformers	8.2.5,8.2.6
	L2: Design of IIR Filter by Impulse Invariance Method	8.3.2
	L3: Design of IIR Filter by Bilinear Transformation Method	8.3.3
14	L1: Characteristics of Commonly Used Filters	8.3.5
	L2: FIR Least-Square Inverse (Wiener) Filters	8.5.3
	L3: Discussions	---

References:

1. Discrete-Time Signal Processing, by Alan V. Oppenheim and Ronald W. Schafer.
2. Schaum's Outlines – Digital Signal Processing, by Monson H. Hayes.
3. Digital Signal Processing – A Computer-Based Approach, by Sanjit K. Mitra (2nd Ed.)

Assessment Policy:

There will be 4 (Four) short quizzes each being 20 – 25 minutes long. The best 3 (Three) will be considered. The weights of the final grading are

- Class participation – 10%
- Quizzes – 20%
- Final Exam – 70%