University of Management and Technology

Course Outline

Course code: EE 315 **Course title:** Signals and Systems

Program	BSEE & BS(H)
Credit Hours	3
Duration	One semester
Prerequisites	None
Resource Person	Dr. Farhat Kaleem
Counseling Timing (Room # 501)	Tuesday and Thursday 12 pm to 2 pm
Contact	farhat.kaleem@umt.edu.pk ilyas.khan@umt.edu.pk

Chairman/Director signature……

Dean's signature…… Date……

Learning Objective:

Upon Completion of the course, the students will be able to:

1. Understand analytical environment of signals and systems.
2. Appreciate few examples of physical systems.
3. Able to define various classes of signals and understand their relevance to analysis.
4. Able to perform time-shifting, flipping, and scaling of signals, in any combination, graphically and analytically, and on both discrete and continuous signals.
5. Demonstrate mathematical and graphical representation and properties of impulse function, step function, sinusoids and complex sinusoid, rectangular pulse and Sinc functions.
6. Evaluate equivalent system of inter-connected systems.
7. Understanding of Impulse-response.
8. Be able to identify whether a system is linear, time-invariant, memoryless, causal, stable and invertible from a mathematical representation of the system.
9. Be able to determine system's properties (memory, causality, invertibility, stability) of LTI systems from a given impulse response.
10. Evaluate convolution-sum of two discrete expressions or graphs.
11. Evaluate convolution-integral of two continuous expressions or graphs.
12. Be able to evaluate impulse and step response from a given differential and difference equations.
13. Be able to evaluate discrete-time Fourier series of discrete periodic signal and plot line spectrum.
14. Be able to evaluate Fourier series of continuous periodic signal and plot line spectrum.
15. Be able to apply properties of Fourier series to evaluate Fourier coefficients.
16. Be able to evaluate Discrete-Time Fourier Transform (DTFT) and plot the resulting spectrum.
17. Be able to evaluate Fourier Transform (FT) and plot the resulting spectrum.
18. Be able to apply properties of Fourier transform and DTFT with the understanding of the basic differences.
19. Be able to evaluate FT and DTFT of periodic signals.
20. Be able to define and describe sampling operation in time and frequency-domain, mathematically and graphically, with a view to Nyquist sampling theorem.
21. Be able to determine whether a sampled signal will alias.
22. Be able to mathematically demonstrate the reconstruction of a sampled signal.

Learning Methodology:

Lecture, interactive, participative

Grade Evaluation Criteria

Following is the criteria for the distribution of marks to evaluate final grade in a semester.

Marks Evaluation	Marks in percentage
Quizzes/Assignments	25
Mid Term	25
Attendance & Class Participation	
Term Project	
Presentations	
Final exam	50
Total	100

Recommended Text Books:

Recommended Book:

Signals & Systems by Simon Haykin and Barry Van Veen, 2nd Edition, John Wiley & Sons

Reference Books:

1) Signals & Systems by Alan V. Oppenheim and Alan S Willisky, 2nd Edition, Pearson Education Inc.

Calendar of Course contents to be covered during semester

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Lecture	Course Contents	Reference Chapter(s)
1	Introduction	1.1-3
2	Introduction to Complex Numbers	
3	Classification of Signals; Basic Operations on Signals	1.4-5
4	Elementary Signals	1.6
5	Interconnection of Systems; Properties of Systems	1.7-8
6	Properties continued	1.8
7-8	The Convolution Sum and its evaluation	2.2-3
9-10	Convolution Integral and its evaluation	2.4-5
11	LTI System Properties and Impulse Response/Step Response	2.7-8
12	LTI Systems as Differential and Difference Equations	2.9
13	Complex Sinusoids and Frequency Response	3.2
14	Fourier Representation of Four Classes of Signals	3.3
	Midterm	
15-16	Discrete-Time Fourier Series	3.4
17-18	Continuous-Time Fourier Series	3.5
19-20	Discrete-Time Fourier Transform (DTFT)	3.6
21-22	Continuous-Time Fourier Transform	3.7
23-24	Properties of Fourier Representation	3.8-16
25-26	Fourier Transform of Periodic Signals; Sampling, aliasing	4.2-5
27-28	Introduction to Laplace transform	
29-30	Introduction to Z-transform	