EC 533 - Digital Signal Processing

COURSE INFORMATION

Course Title: Digital Signal Processing.

Code: EC 533.

Hours: Lecture – 2 Hr. Tutorial/Lab – 2/2 Hrs. Credit – 3.

Prerequisite: EC 434.

GRADING

Midterm # 1 (7th Week):	30%
5th Week Exam	10%
6th Week Lab. Exam	5%
7th Week Exam	15%
Midterm # 2/ (12th Week):	20%
12th Week Exam	15%
12th Week Lab. Exam	5%
Laboratory Reports and Final Exam	10%
Final Exam	40%

COURSE DESCRIPTION:

ADC's and DAC's, DFT, FFT and DCT, the Z-transform, discrete time transfer function, realization topologies, FIR filter design using windowing, Optimal method, frequency sampling method , least pth norm method using MATLAB . IIR filter design, stability, bilinear transform, least pth norm method using MATLAB. Applications of DSP e.g.data compression Data acquisition systems….etc

TEXT BOOKS:

Applied Signal Processing, N. Hamdy CRC Press 2008

REFERENCE BOOKS:

Digital signal processing,.E. I feachor, B.Jervis, Addison-Wesly, 1993

Electronic analog to digital converters, Seitzer, Pretzl, and Hamdy, John Wilay & Sons. 1983

Digital filters, A.Antoniou, McGraw-Hill, 1993

Analog and Digital Signal Processing, H.Baher, John Willey & sons, 1990

COURSE AIM:

Introducing the different techniques for designing and implementing digital signal processing systems and their peripherals, Discrete – time transforms.

COURSE OBJECTIVES:

The student should be familiar with:

ADC and DAC techniques and their circuit implementation

The DFT,THE DCT and the FFT algorithms

The discrete time transfer function

Design procedures of digital filters

Realization topologies

Design of FIR and IIR filters

MATLAB usage in designing digital filters

Some practical applications of DSP

COURSE OUTLINE:

Week Number 1: Why digital signal processing? Analog-vs-Digital signal processing, Examples of practical DSP applications, Recent trends

Week Number 2: A real-time DSP system, Sampling of Band limited analog signals, Specifications of data converters, DAC's

Week Number 3: Quantizer characteristics, Quantization techniques, Analog comparators, Circuit implementation of quantization techniques.

Week Number 4: The cascaded architecture, Single and dual slope converters

Week Number 5: Discrete-Time transforms, The discrete-time Fourier transform, The FFT algorithm ,The Butterfly properties

Week Number 6: The DFT, the DCT, the DIT FFT algorithm and its inverse (IFFT).

Week Number 7: Digital filters, Basic definitions, analog vs digital filters, Design procedures.

Week Number 8: The discrete-time transfer function, Types of digital filters, Digital filters describing equations, recursive versus non-recursive filters

Week Number 9: The Z-transform. Digital filter components, Examples of digital filter circuits.

Week Number 10: Time domain analysis, Frequency domain analysis, Stability, a sability criterion.

Week Number 11: Design of digital filters, Design procedures, Realization topologies, Hardware implementation

Week Number 12: Properties of FIR filters, Realization topologies, The concept of windowing The rectangular window. Design of FIR filters using windows, The Bartlett, Von Hann, and Hamming windows, Blackman and Kaiser, Examples

Week Number 13: Design of IIR filters using the Bilinear z-transform, frequency warping, Design from the Pole-Zero distribution, Design from the tolerance structure, Examples

Week Number 14: Data compression ,an intro, DAS's, DSP applications

Week Number 15: Revision