EC533- Digital Signal Processing

CREDIT HOURS

3 Hours

CONTACT HOURS (Hours/week)

Lecture: 2; Tutorial: 2; Lab: 2

COURSE COORDINATOR

Dr. Khaled Shehata

TEXT BOOK

Applied Signal Processing, N. Hamdy CRC Press 2008

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

PREREQUISITE:

EC 434

RELATION OF COURSE TO PROGRAM

Required

COURSE INSTRUCTION OUTCOMES

The student will be able to 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

TOPICS COVERED

- Why digital signal processing? Analog-vs-Digital signal processing, Examples of practical DSP applications, Recent trends
- A real-time DSP system, Sampling of Band limited analog signals, Specifications of data converters, DAC's
- Quantizer characteristics, Quantization techniques, Analog comparators, Circuit implementation of quantization techniques.
- The cascaded architecture, Single and dual slope converters
- Discrete-Time transforms, The discrete-time Fourier transform, The FFT algorithm ,The Butterfly properties

- The DFT, the DCT, the DIT FFT algorithm and its inverse (IFFT).
- Digital filters, Basic definitions,analog vs digital filters, Design pocedures.
- The discrete-time transfer function, Types of digital filters, Digital filters describing equations, recursive versus non-recursive filters
- The Z-transform. Digital filter components, Examples of digital filter circuits.
- Time domain analysis, Frequency domain analysis, Stability, a sability criterion.
- Design of digital filters, Design procedures, Realization topologies, Hardware implementation
- 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
- Design of IIR filters using the Bilinear z-transform, frequency warping, Design from the Pole-Zero distribution, Design from the tolerance structure, Examples
- Data compression ,an intro, DAS's, DSP applications

CONTRIBUTION OF COURSE TO MEET THE REQUIREMENTS OF CRITERION 5:

Professional component Content			
Math and Basic Sciences	**Engineering Topics**	**General Education**	**Other**
	✓		

RELATIONSHIP OF COURSE TO STUDENT OUTCOMES:

Student Outcomes		Course aspects
A	An ability to apply knowledge of mathematics, science, and engineering	a_1 a_2
B	An ability to design and conduct experiments, analyze and interpret data.	b_1 b_2 b_3 b_4
C	An ability to design a system, component, or process to meet desired needs within realistic constraints such as economics, environmental, social, political, ethical, health, and safety, manufacturability, and sustainability	c_1 c_2 c_3
D	An ability to function on multi-disciplinary teams.	
E	An ability to identify, formulate, and solve engineering problems	
F	An understanding of professional and ethical responsibility	
G	An ability to communicate effectively	
H	The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and social content	
I	A recognition of the need for, and an ability to engage in life-long learning.	
J	A knowledge of contemporary issues within and outside the electrical engineering profession.	
k	An ability to use the techniques, skills, and modern engineering tools necessary for electrical engineering practice.	k