ECE 477 - Digital Signal Processing

2005-06 Catalog Data: ECE 477: Digital Signal Processing. Discrete time signals and systems. The discrete time Fourier transform. The z-transform. The inverse z-transform. The discrete Fourier series. The discrete Fourier transform. Circular convolution. Representation of linear digital networks. Network structures for IIR systems. Network structures for FIR systems. Design of IIR digital filters. Digital Butterworth filters. Design of FIR filters. Computation of the discrete Fourier transform. The FFT. Written reports are required for each of the three design projects. Prerequisite: EE 335. Offered in the Spring semester. One design credit. *One semester; three credits.*

Textbook: Sanjit K. Mitra, *"Digital Signal Processing, a Computer-Based Approach"*, 2nd ed., Prentice Hall, 2001.

Coordinator: Dr. Juan Carlos Olabe-Basogain, Professor of Electrical Engineering.

Goals: This course is designed to give seniors in Electrical Engineering a background in digital signal processing, explore the applications for dsp concepts, understand in depth the theory and applications of this technology, and prepare students for the study of more advanced topics and applications.

Prerequisites by Topic:

1. Advanced calculus, complex variable theory.
2. Linear systems theory, Laplace and Fourier transforms.

Topics:		**Classes**	**Design**
1.	Discrete-time signal and systems.	4	(1)
2.	The discrete-time Fourier transform.	2	(-)
3.	The z-transform, the inverse z-transform.	5	(1)
4.	The discrete Fourier series, the D.F. transform.	4	(1)
5.	Circular convolution.	2	(1)
6.	Representation of linear digital networks.	2	(1)
7.	Network structures for IIR systems.	2	(1)
8.	Network structures for FIR systems.	2	(1)
9.	Design of IIR digital filters, Butterworth.	5	(2)
10.	Design of FIR digital filters.	5	(2)
11.	Computation of the discrete Fourier transform.	6	(2)
12.	Tests.	3	(1)
	TOTALS	42	(14)

Computer Usage:

The students use MathCAD to simulate, test, and evaluate the two design projects.

Estimated ABET Category Content:

Engineering Science:	2 credits or 67%
Engineering Design:	1 credit or 33%

Prepared by: Dr. Juan Carlos Olabe Date: October 2005