

Polytechnic University of Puerto Rico
Department of Electrical Engineering
Master's Degree in Electrical Engineering

Course Syllabus

Course Title : Digital Signal Processing

Course Code : EE 5720

Credits : Three (3) credits

Duration : One academic quarter.

Schedule : Forty-five credit hours per course.

Prerequisites : Undergraduate Signal and Systems, Undergraduate Probability and Statistics.

Course Description

Topics include LSI systems, DTFT, DFT, FFT, sampling, linear and cyclic convolution, the Z-transform, and filter structures. Introduction to FIR and IIR digital filter design. Several DSP applications are discussed and demonstrated. A design project is required.

Justification

DSP is widely used in the electronic industry. Audio, video, medicine, computers, satellites, and cellular communications are just some of the areas that make intensive use of this technology. This course gives the student the theoretical fundamentals, as well as the needed practical exposure for further studies in this important field.

Objectives

After completing this course the students should master the theoretical principles of discrete time signal processing and be familiar with some of its basic applications. This course provides enough background so that the student can pursue further graduate studies and/or may enter the industry workforce. In order to achieve these objectives:

1. The student will be exposed through, lectures, homework, exams and projects to the basic theory of discrete time signal processing.
2. The student will have a design experience as a part of a team through a suitable design project.
3. The students will enhance their written and oral communication skills through the preparation of a written project report and a short oral presentation.

4. The students will work with DSP applications through examples, assignments, projects and demonstrations in areas such as spectral analysis, filtering, and audio processing.
5. The students will use state of the art software packages, such as MATLAB, in various assignments, projects and demonstrations.

Textbook

Introduction to Signal Processing (1996)

S. Orfanides

Prentice Hall

New York, N.Y

ISBN: 0-13-209172-0

Software: MATLAB

Topics Covered

1. Linear Shift Invariant Systems.
2. Discrete Linear Convolution.
3. Discrete Time Fourier Transform properties.
4. Sampling.
5. Discrete Fourier Transform. Properties
6. The FFT.
7. Cyclic convolution.
8. Introduction to Spectral Analysis.
9. Z-Transform. Properties.
10. Difference Equations.
11. Filter Structures.
12. Introduction to FIR filter design.
13. Introduction to IIR filter design.
14. Applications.

Evaluation Criteria

Final course grade will be determined, unless otherwise accorded in class, based on the following scale:

100-90	A
89-80	B
79-70	C
69-60	D
59-0	F

Final project is suggested to be 10% to 15% of the final grade. Homework is suggested to be 0% to 10% of the final grade. Two or three quizzes and a final exam are recommended.

Course History

April 2002; prepared by Marvi Teixeira, Ph.D., P.E.

May 2002; revised by Roman Lopez, PhD, P.E.

Bibliography

Digital Signal Processing. A practical Approach. (2002)

by E. C. Ifeachor and B. W. Jervis.

2nd Edition

Prentice Hall

ISBN: 0-201-59619-9

Digital Signal Processing. A Computer-Based Approach.(2001)

by S. K. Mitra.

2nd Edition

Mc Graw-Hill

ISBN: 0-07-232105-9

Digital Signal Processing Using MATLAB® (1999)

Vinay K. Ingle, John G. Proakis

1st Edition

Brooks/Cole.

ISBN: 0534371744

Discrete Time Signal Processing. (1999)

by A. V. Oppenheim and R. W. Schaffer

2nd Edition

Prentice Hall.

ISBN: 0-13-754920-2

A Course in Digital Signal Processing. (1997)

by B. Porat.

1st Edition

John Wiley & Sons

ISBN:0-471-14961-6

Digital Signal Processing. (1996)

by J. G. Proakis and D. G. Manolakis.

3rd Edition

Prentice Hall.

ISBN: 0-13-373762-4

Digital Signal Processing. A System Design Approach. (1988)
by D. DeFatta, J. G. Lucas and W. S. Hodgkiss.
1st Edition
John Wiley & Sons.
ISBN: 0-471-83788-1