



University of Nicosia, Cyprus

<b>Course Code</b> ECE-430	<b>Course Title</b> Digital Signal Processing	<b>ECTS Credits</b> 6
<b>Department</b> Engineering	<b>Semester</b> Fall	<b>Prerequisites</b> ECE-330, MATH-280
<b>Type of Course</b> Required	<b>Field</b> Engineering	<b>Language of Instruction</b> English
<b>Level of Course</b> 1 <sup>st</sup> Cycle	<b>Year of Study</b> 4 <sup>th</sup>	<b>Lecturer(s)</b> Dr Ioannis Kyriakides
<b>Mode of Delivery</b> Face-to-face	<b>Work Placement</b> N/A	<b>Co-requisites</b> None

**Objectives of the Course:**

The main objectives of the course are to:

- provide the students with the mathematical tools for processing discrete signals and analyzing the behavior of discrete systems
- explain the z and Fourier domain characteristics of discrete signals and systems

**Learning Outcomes:**

After completion of the course students are expected to be able to:

1. define the mathematical relationship between a continuous time signal and a discrete time signal and the method of conversion between the two
2. apply basic signal operations such as convolution and correlation in the discrete domain
3. express discrete signals in the z-domain and perform inverse z-transform
4. apply Fourier analysis of discrete signals
5. explain implementations of the fast Fourier transform

**Course Contents:**

1. Signals, systems and signal processing, classification of signals, the concept of frequency in continuous-time and discrete-time signals, analog-to-digital and digital-to-analog conversion
2. Discrete-time signals and systems: analysis of discrete-time linear time-invariant systems, discrete-time systems described by difference equations, implementation of discrete-time systems, correlation of discrete-time signals
3. The z-transform and its applications: properties of the z-transform, inverse z-transform, analysis of linear time-invariant systems in the z-domain
4. Frequency analysis of signals and systems: frequency analysis of continuous-time and discrete-time signals, properties of the Fourier transform, frequency-domain characteristics of linear time-invariant systems, linear time-invariant systems as frequency-selective filters, inverse systems and deconvolution
5. The discrete Fourier transform – its properties and applications: frequency domain sampling – the discrete Fourier transform (DFT), properties of the DFT, linear

- filtering methods based on the DFT, frequency analysis of signals based on the DFT
6. Efficient computation of the DFT: fast Fourier transform algorithms, applications of FFT algorithms, a linear filtering approach to computation of the DFT, quantization effects in the computation of the DFT

**Learning Activities and Teaching Methods:**

Lectures, in-class assignments.

**Assessment Methods:**

Homework, in-class assignments, projects, exams, final exam.

**Required Textbooks/Reading:**

<b>Authors</b>	<b>Title</b>	<b>Publisher</b>	<b>Year</b>	<b>ISBN</b>
J. Proakis and D. Manolakis	Digital Signal Processing: Principles, Algorithms and Applications	Pearson Prentice Hall	2007	0131873741

**Recommended Textbooks/Reading:**

<b>Authors</b>	<b>Title</b>	<b>Publisher</b>	<b>Year</b>	<b>ISBN</b>
Oppenheim and Shafer	Discrete-Time Signal Processing	Prentice Hall	1999	0137549202
J. McClellan, R. Schafer, and M. Yoder	DSP First: a Multimedia Approach	Prentice Hall	1998	0132431718