UNIVERSITY of NICOSIA

Course Code	Course Title	ECTS Credits
ECE-430	Digital Signal Processing	6
Department	**Semester**	**Prerequisites**
Engineering	Fall	ECE-330, MATH-280
Type of Course	**Field**	**Language of Instruction**
Required	Engineering	English
Level of Course	**Year of Study**	**Lecturer(s)**
1st Cycle	4th	Dr Ioannis Kyriakides
Mode of Delivery	**Work Placement**	**Co-requisites**
Face-to-face	N/A	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:

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

Recommended Textbooks/Reading:

Authors	Title	Publisher	Year	ISBN
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