UNIVERSITY of NICOSIA

Course Syllabus

Course Code	Course Title	ECTS Credits
ECE-332	Probability and Random Signals	6
Prerequisites	**Department**	**Semester**
ECE-331	Engineering	Spring
Type of Course	**Field**	**Language of Instruction**
Required	Engineering	English
Level of Course	**Lecturer(s)**	**Year of Study**
1st Cycle	Dr George Gregoriou	3rd
Mode of Delivery	**Work Placement**	**Corequisites**
Face-to-face	N/A	None

Course Objectives:

The main objectives of the course are to:

- Study random variables and random processes as they apply in the electrical and computer engineering disciplines.
- Understand a set theory approach to probability.
- Develop an understanding of discrete and continuous random variables and how they can be used to model and analyze systems.
- Introduce probability density functions and cumulative distribution functions, and how they can be used to characterize engineering systems.
- Introduce sets of random variables and how they relate to electrical engineering applications.
- Provide students with the basics of stochastic processes and their application to signal processing and communications systems.

Learning Outcomes:

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

- Demonstrate knowledge and understanding of probability theory and statistics as they apply in the electrical and computer engineering disciplines.
- Differentiate the elements of the random experiment model.
- Explain non-deterministic phenomena using the random experiment model.
- Apply the concept of random variable and to use the probability distribution and density function associated with the random variable in calculating probabilities of events.

- Extend the concept of a random variable to that of a random process as an indexed set of random variables.

Course Content:

- Probability: set definitions, set operations, probability introduced through sets, joint and conditional probability, independent events, combined experiments, Bernoulli trials.
- Random variable: the random variable concept, distribution function, density function, the Gaussian random variable, other distribution and density functions, conditional distribution and density functions.
- Operations on one random variable: expectation, moments, functions that give moments, transformations of a random variable.
- Multiple random variables: vector random variables, joint distribution and its properties, joint density and its properties, conditional distribution and density, statistical independence, distribution and density of a sum of random variables.
- Operations on multiple random variables: expected value of a function of random variables, joint moments about the origin and joint central moments, jointly Gaussian random variables.
- Random processes: the random process concept, classification of random processes, stationarity and independence, correlation functions.

Learning Activities and Teaching Methods:

Lectures, in-class examples and exercises.

Assessment Methods:

Homework, mid-term exam, final exam.

Required Textbooks / Readings:

Title	Author(s)	Publisher	Year	ISBN
Probability, Random Variables and Random Signal Principles	P. Z. Peebles	McGraw Hill	2001	0073660078

Recommended Textbooks / Readings:

Title	Author(s)	Publisher	Year	ISBN
A First Course in Probability	S. Ross	Pearson Prentice Hall	2005	0131856626
Probability, Random Variables and Stochastic Processes	A. Papoulis, S. Pillai	McGraw Hill	2001	0073660116