



University of Nicosia, Cyprus

<b>Course Code</b> MATH-225	<b>Course Title</b> Probability and Statistics I	<b>ECTS Credits</b> 6
<b>Department</b> Computer Science	<b>Semester</b> Fall, Spring	<b>Prerequisites</b> MATH-190, MATH-101 or MATH-185
<b>Type of Course</b> Required	<b>Field</b> Mathematics	<b>Language of Instruction</b> English
<b>Level of Course</b> 1st Cycle	<b>Year of Study</b> 2 <sup>nd</sup>	<b>Lecturer(s)</b> Dr George Portides
<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 in-depth knowledge of how to summarize and present univariate data
- Cover probability concepts, random variables and their distributions in detail
- Discuss the concept of expectation of functions of random variables
- Make students aware of the importance of the central limit theorem and the laws of large numbers.

### Learning Outcomes:

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

1. Produce summary statistics and present data
2. Use the laws and rules of probability to solve combinatorial problems
3. Explain the behaviour of the most common probability distributions
4. Calculate expected values of functions of random variables
5. Handle moments and moment generating functions of random variables

### Course Contents:

1. Descriptive Statistics: data Summary and Presentation
  - Relative and Cumulative Frequency distributions
  - Histograms and Bar Charts
  - Measures of Location and Dispersion
2. Probability
  - Classical, Empirical, Subjective and Axiomatic definitions of Probability
  - Definitions of Sample space, Event
  - Axioms and Laws of Probability
  - Conditional Probability, Bayes Theorem, Independence
  - Applications to combinatorial problems
3. Discrete Random Variables and Probability Distributions

- Binomial Variable and Distribution
  - Poisson Variable and Distribution
  - Applications in Statistics
4. Continuous Random Variables and Probability Distributions
- Uniform Variable and Distribution
  - Normal Variable and Distribution
  - Exponential Variable and Distribution
  - Applications in Statistics
4. Expectation
- Expectation for Discrete and Continuous Random Variables
  - Moments
  - Moment Generating Functions
4. Limit Theorems
- The Central Limit Theorem
  - Laws of Large Numbers

**Learning Activities and Teaching Methods:**

Lectures, Practical Exercises and Assignments.

**Assessment Methods:**

Homework, Mid-Term, Final Exam.

**Required Textbooks/Reading:**

Authors	Title	Publisher	Year	ISBN
Milton S and Arnold J	Introduction To Probability and Statistics: Principles and Applications for Engineering and the Computing Science	McGraw Hill	2002	9780071198592

**Recommended Textbooks/Reading:**

Authors	Title	Publisher	Year	ISBN
Walpole R.E. and Myers R.H.	Probability & Statistics for Engineers & Scientists	Pearson	2006	9780131877115
Johnson J.L.	Probability and Statistics for Computer Science	Wiley	2008	9780470383421