



University of Nicosia, Cyprus

<b>Course Code</b> MATH-325	<b>Course Title</b> Probability and Statistics II	<b>ECTS Credits</b> 6
<b>Department</b> Mathematics	<b>Semester</b> Fall	<b>Prerequisites</b> MATH-225, MATH-270, MATH-280
<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> 3 <sup>rd</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:

- Cover marginal, conditional and joint distributions in detail.
- Discuss the concepts of covariance and correlation from the mathematical expectation point of view.
- Conceptualize statistical estimators and properties we desire from them.
- Present the derivation of the statistical distributions used in basic statistical inference.
- Cover inferences of the mean and variance.

**Learning Outcomes:**

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

1. Use mathematical techniques on marginal, conditional and jointly distributed random variables.
2. Calculate the covariance and correlation of two random variables
3. Formulate the least squares and maximum likelihood estimator of a random variable
4. Calculate the bias and validate the consistency of estimators, as well as measure their efficiency.
5. Carry out inferences on the mean and variance of a random variable.

**Course Contents:**

1. Marginal, Conditional and Joint Distributions
2. Covariance and Correlation
3. Estimators
  - Least Squares Estimator
  - Maximum Likelihood Estimator
4. Properties of Estimators
  - Unbiasedness
  - Consistency
  - The Cramer-Rao inequality
5. Inferences on the mean and variance of a random variable

**Learning Activities and Teaching Methods:**

Lectures, Practical Exercises and Assignments.
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**Assessment Methods:**

Homework, Mid-Term, Final Exam.
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**Required Textbooks/Reading:**

<b>Authors</b>	<b>Title</b>	<b>Publisher</b>	<b>Year</b>	<b>ISBN</b>
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:**

<b>Authors</b>	<b>Title</b>	<b>Publisher</b>	<b>Year</b>	<b>ISBN</b>
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