

## COURSE OUTLINE

### (1) GENERAL

<b>SCHOOL</b>	SCHOOL OF SCIENCES		
<b>ACADEMIC UNIT</b>	DEPARTMENT OF MATHEMATICS		
<b>LEVEL OF STUDIES</b>	UNDERGRADUATE PROGRAM		
<b>COURSE CODE</b>		<b>SEMESTER</b>	<b>F</b>
<b>COURSE TITLE</b>	PROBABILITY I		
<b>INSTRUCTOR</b>	Theodosios Dimitrakos		
<b>INDEPENDENT TEACHING ACTIVITIES</b>	<b>WEEKLY TEACHING HOURS</b>	<b>CREDITS</b>	
	6	9	
<b>COURSE TYPE</b>	General background		
<b>PREREQUISITE COURSES:</b>	NO		
<b>LANGUAGE OF INSTRUCTION and EXAMINATIONS:</b>	GREEK		
<b>IS THE COURSE OFFERED TO ERASMUS STUDENTS</b>	YES		
<b>COURSE WEBSITE (URL)</b>	<a href="http://www.math.aegean.gr/index.php/en/academics/undergraduate-programs">http://www.math.aegean.gr/index.php/en/academics/undergraduate-programs</a>		

### (2) LEARNING OUTCOMES

<b>Learning outcomes</b>
The basic aim of the course is the understanding of basic rules for computing probabilities. Furthermore, the students become familiar with one-dimensional random variable and its expected value and variance. Basic discrete and continuous random variables are presented. Many applications of probability theory with practical interest are also provided.
<b>General Competences</b>
Search for, analysis and synthesis of data and information, with the use of the necessary methodology. Production of new research ideas. Production of free, creative and inductive thinking.

### (3) SYLLABUS

Random phenomena, Sample space, Events, $\sigma$ -algebra, Probability space, The axiom of continuity, Basic probability properties. Conditional probability, Bayes formula, Independent events, Basic combinatorial theory, Permutations-Combinations, Stirling formula, Random variables, Probability Distribution function and its properties, Independent random variables, Discrete random variables, Moments, Expected value, Variance, Examples of discrete random variables, Binomial, Geometric, Hypergeometric, Poisson and Negative Binomial distribution, Random vectors, Covariance, The mean and the variance of sum of random variables. The Weak Law of Random numbers, The Strong Law of Random numbers, Bernoulli trials, The Borel-Cantelli Lemma, Continuous random variables, Probability density function. Multidimensional distributions.	
<b>TEACHING MATERIAL DISTRIBUTION</b>	The teaching material of the course is uniformly distributed during the semester.

### (4) TEACHING and LEARNING METHODS - EVALUATION

<b>DELIVERY</b>	Face-to-face
<b>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY</b>	<ul style="list-style-type: none"> <li>• Communication with students via e-mail</li> <li>• Uploading course material on moodle system.</li> </ul>

TEACHING METHODS	<i>Activity</i>	<i>Semester workload</i>
	Lectures	52
	Tutorials	26
	Independent study	147
	Course total (25 per ECTS)	<b>225</b>
<b>COURSE COMMITMENTS</b>	Attending course and tutorial sessions is not obligatory.	
<b>STUDENT PERFORMANCE EVALUATION</b>	Student's evaluation is done in Greek through a written examination which includes short-answers questions and problem solving. For students with disabilities, evaluation takes place via oral exams.	

### (5) ATTACHED BIBLIOGRAPHY

1. Basic Topics in Probability Theory, Sheldon Ross.
2. Introduction to Probabilities, T. Papaioannou.
3. Probability and Statistics, Murray R. Spiegel.
4. Introduction to Probabilities, D. Bertsekas, G. Tsitsiklis.
5. Introduction to Probability Theory and Applications, M. Koutras.

- *Suggested Foreign Bibliography:*

1. A first course in Probability, Sheldon Ross, Macmillan, Second Edition.