COURSE OUTLINE

GENERAL

SCHOOL	School of Science		
ACADEMIC UNIT	Department of Mathematics		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	MAY331	**SEMESTER**	**3rd**
COURSE TITLE	**Introduction to Probability**		

INDEPENDENT TEACHING ACTIVITIES *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits*	**WEEKLY TEACHING HOURS**	**CREDITS**
Lectures	5	7,5
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	General background
PREREQUISITE COURSES:	
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes (in English, reading Course)
COURSE WEBSITE (URL)	http://www.math.uoi.gr/~kzograf/SyllabousProbabilityEnglish.pdf

LEARNING OUTCOMES

Learning outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.

Consult Appendix A

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

The aim of this course is to provide with a comprehensive understanding of the basic definitions of probability and the basic principles and laws of probability theory. Further, the introduction to the concepts of the random variable and the distribution function, as well as, their characteristics, such as the mean, variance, moments, moment generating function, etc., is included in the main scopes of the course. Special distributions, such as binomial, geometric, Pascal, Poisson, uniform,

exponential, gamma, normal distribution, etc. are studied and their use and application is indicated.

The course is compulsory, entry-level and focuses on developing skills to understand, design and manufacture non-deterministic, stochastic (i.e. probabilistic) models in order to study the respective problems. At the end of the course students should be able to :
(1) Work with classical and empirical definition of probability in order to calculate probabilities, by using combinatorial analysis.
(2) Appreciate the axiomatic foundation of the concept of probability and use it in order to prove probabilistic laws and properties.
(3) Understand and utilize probabilistic laws as the multiplicative theorem, the total probability theorem, Bayes' formula, and independence for modeling respective problems. Emphasis is given to the use of interdisciplinary problems which are modeled by the application of the above probabilistic rules.
(4) Understand the necessity of introducing and studying the concept of random variable, its characteristics (mean, variance, etc.) and the corresponding probability distribution. Special discrete and continuous distributions are defined and utilized for the description, analysis and study of applications from different areas (lifetime distributions, reliability etc.).

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology
Adapting to new situations
Decision-making
Working independently
Team work
Working in an international environment
Working in an interdisciplinary environment
Production of new research ideas
Project planning and management
Respect for difference and multiculturalism
Respect for the natural environment
Showing social, professional and ethical responsibility and sensitivity to gender issues
Criticism and self-criticism
Production of free, creative and inductive thinking
Others

Working independently
Decision-making
Production of free, creative and inductive thinking
Criticism and self-criticism

SYLLABUS

Basic ideas and laws of probability: Sample space and events. Classical-Statistical and Axiomatic definition of probability. Properties of probability. Elements of combinatorial analysis. Random variables and distribution functions. Discrete and continuous random variables and distribution functions. Standard discrete and continuous distributions: Binomial, Geometric, Pescal, Poisson, Uniform, Exponential, gamma, Normal etc. Characteristics of random variables and

probability distributions: Expectation, variance, moments, moment generating function, properties. Transformation of random variables.

TEACHING and LEARNING METHODS - EVALUATION

<table>
<tr><td>DELIVERY
Face-to-face, Distance learning, etc.</td><td>Classroom (face-to-face)</td></tr>
<tr><td>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY
Use of ICT in teaching, laboratory education, communication with students</td><td>Use of ICT in communication with students</td></tr>
<tr><td>TEACHING METHODS
The manner and methods of teaching are described in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.

The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS</td><td>
<table>
<tr><th>Activity</th><th>Semester workload</th></tr>
<tr><td>Lectures</td><td>65</td></tr>
<tr><td>Working independently</td><td>100</td></tr>
<tr><td>Exercises-Homeworks</td><td>22,5</td></tr>
<tr><td></td><td></td></tr>
<tr><td></td><td></td></tr>
<tr><td></td><td></td></tr>
<tr><td></td><td></td></tr>
<tr><td></td><td></td></tr>
<tr><td></td><td></td></tr>
<tr><td>Course total</td><td>187,5</td></tr>
</table>
</td></tr>
<tr><td>STUDENT PERFORMANCE EVALUATION
Description of the evaluation procedure

Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other

Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</td><td>Final written exam in Greek (in case of Erasmus students in English) which includes resolving application problems.</td></tr>
</table>

ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

Books in English:
Ross, S. (1998). A First Course in Probability. 5th Edition. Prentice Hall, Inc.
Roussas, G. (2007). Introduction to Probability. Academic Press.
Books in Greek
Ζωγράφος, Κ. (2008). Πιθανότητες, Πανεπιστήμιο Ιωαννίνων.
Hoel, P., Port, S. and Stone, C. (2001). Εισαγωγή στη Θεωρία Πιθανοτήτων. Πανεπιστημιακές Εκδόσεις Κρήτης.
Κουνιά, Σ. και Μωϋσιάδη, Χ. (1995). Θεωρία Πιθανοτήτων Ι. Εκδόσεις Ζήτη, Θεσσαλονίκη.
Κούτρας, Μ. (2012). Εισαγωγή στη Θεωρία Πιθανοτήτων και Εφαρμογές. Εκδόσεις Α. Σταμούλης. Αθήνα.
Παπαϊωάννου, Τ. (2000). Εισαγωγή στις Πιθανότητες. Εκδόσεις Α. Σταμούλης. Αθήνα.
Χαραλαμπίδη, Χ. (1990). Θεωρία Πιθανοτήτων και Εφαρμογές. Τεύχος 1. Εκδόσεις Συμμετρία. Αθήνα.