COURSE OUTLINE

1. GENERAL

SCHOOL	NATURAL SCIENCES		
DEPARTMENT	MATHEMATICS		
LEVEL OF COURSE	UNDERGRADUATE		
COURSE CODE	MAT_ST201	**SEMESTER OF STUDIES**	3rd
COURSE TITLE	PROBABILITY I		

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*	**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
Lectures and Tutorials	5	8
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*	Core course of a scientific subject area
PREREQUISITE COURSES:	Recommended prerequisite knowledge: INTRODUCTION TO ALGEBRA AND SET THEORY, CALCULUS I and II, DISCRETE MATHEMATICS
TEACHING AND ASSESSMENT LANGUAGE:	Greek
THE COURSE IS OFFERED TO ERASMUS STUDENTS	Yes
COURSE WEBPAGE (URL)	https://eclass.math.upatras.gr/courses/MATHDEP218/

2. 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*

A primary outcome is that the student will learn to view probability not just as a proportion or a relative frequency but also as a mathematical object (a function) that satisfies certain intuitively appealing but rigorously defined properties (axioms). He or she will further comprehend how many phenomena of uncertain behavior actually obey specific probability laws.

In addition, the student will learn to provide a summary of the behavior of such phenomena, by means of numerical characteristics (such as the mean and the variance).

Upon successful completion of the course, the student should have a clear perception of the notion of a random phenomenon as well as the probability distribution of its possible outcomes and be competent to identify and apply probability models in practice.

General Abilities

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

The course is intended to help student acquire the following general abilities:

- Decision making.
- Autonomous work.
- Teamwork.
- Ability to work in an interdisciplinary environment.
- Ability to promote free, productive and inductive thinking.

3. COURSE CONTENT

Basic elements of set theory. Random experiment, sample space, events, classical, frequentistic and axiomatic definition of probability. Basic properties of probability, Poincare's formula and continuity theorem. Elements of combinatorial analysis and probabilistic applications. Conditional probability and stochastic independence. Multiplication rule, total probability theorem and Bayes rule. Univariate discrete and (absolutely) continuous random variables. Distribution function, probability mass function and probability density function. Special discrete and continuous distributions: Binomial, Geometric, Negative Binomial, Poisson, Hypergeometric, Uniform, Normal, Exponential, Gamma, Beta, Cauchy. Expected value, variance, standard deviation, moments and other parameters of random variables.

In order to highlight the special educational and didactical aspects of a course, special emphasis is given on the historical evolution and scientific development of the subject as well as on its applications in technology and/or other sciences.

4. TEACHING AND LEARNING METHODS - ASSESSMENT

TEACHING METHOD *Face-to-face, Distance learning, etc.π.*	Lectures (face to face)
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES *Use of ICT in teaching, laboratory education, communication with students*	Support of the course via the online platform *eClass* and the discussion forum of the Department of Mathematics
TEACHING ORGANIZATION *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*	
STUDENT ASSESSEMNT *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*	**Assessment Language:** Greek **Assessment Language for Erasmus students:** English **Assessment methods:** Final written examination (100%) made up of theory questions and exercises Minimum passing grade: 5 Μαximum passing grade: 10

Activity	***Semester workload***
Lectures	39
Tutorials	26
Solving homework problems	50
Personal study	82
Final examination	*3*
Total number of hours for the Course (25 hours of work-load per ECTS credit)	***200***

5. RECOMMENDED LITERATURE

(in Greek)

- Κούτρας Μάρκος. *Εισαγωγή στη Θεωρία Πιθανοτήτων και Εφαρμογές*. 2η Έκδοση, Εκδόσεις Τσότρας, 2016.
- Χαραλαμπίδης Χαράλαμπος. *Θεωρία Πιθανοτήτων και Εφαρμογές. ΤΕΥΧΟΣ 1*. Εκδόσεις Συμμετρία, 2000.
- Ρούσσας Γεώργιος Γ. *Εισαγωγή στην Πιθανοθεωρία.* Εκδόσεις Ζήτη, 2011.

(*in English*)

- Ross Sheldon. *A First Course in Probability*. 9th ed., Pearson, 2013.
- Roussas George G. *Introduction to Probability*. Academic Press, 2014.
- Hoel Paul, Port Sidney and Stone Charles. *Introduction to Probability Theory*. Houghton Mifflin, 1972.