

COURSE OUTLINE

1. GENERAL

SCHOOL	NATURAL SCIENCES		
DEPARTMENT	MATHEMATICS		
LEVEL OF COURSE	UNDERGRADUATE		
COURSE CODE	MAT_ST436	SEMESTER OF STUDIES	7 th
COURSE TITLE	STOCHASTIC PROCESSES		
INDEPENDENT TEACHING ACTIVITIES <i>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</i>	TEACHING HOURS PER WEEK	ECTS CREDITS	
Lectures and Tutorials	4	6	
<i>Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).</i>			
COURSE TYPE <i>general background, special background, specialised general knowledge, skills development</i>	Compulsory course for the specialization <i>Statistics, Probability Theory and Operational Research</i> Elective course for each of the other specializations		
PREREQUISITE COURSES:	<u>Recommended prerequisite knowledge:</u> THEORY OF PROBABILITY I and II		
TEACHING AND ASSESSMENT LANGUAGE:	Greek		
THE COURSE IS OFFERED TO ERASMUS STUDENTS	Yes		
COURSE WEBPAGE (URL)	https://eclass.upatras.gr/courses/MATH944/		

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*

- To have a good understanding of the properties of the Poisson process.
- To have insight into Markov chains, Markov processes and birth-and-death processes, and to be able to determine their steady-state distribution.
- To develop aptitude in analysing random walks.
- To get a feeling for the application of stochastic process theory in the analysis and optimization of all kinds of phenomena in industry and society.
- Able to handle a modeling problem of modest size in the field of stochastics.

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
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...

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

3. COURSE CONTENT

A stochastic process is a collection of random variables. We define and classify stochastic processes. Subsequently we provide extensive treatments of the following stochastic processes: the Poisson process, Markov chains, Markov processes, birth-and-death processes, random walks (classification of states, visits to a fixed state, transient and limiting behavior). We also discuss several applications of stochastic processes. The modeling of various every-day life situations (insurance, queues, biological phenomena) as stochastic process receives special attention.

4. TEACHING AND LEARNING METHODS - ASSESSMENT

TEACHING METHOD <i>Face-to-face, Distance learning, etc.</i>	Lectures (face to face)	
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES <i>Use of ICT in teaching, laboratory education, communication with students</i>	Support of the course via the online platform <i>eClass</i> of University of Patras	
TEACHING ORGANIZATION <i>The manner and methods of teaching are described in detail.</i> <i>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.</i> <i>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</i>	Activity	Semester workload
	Lectures	39
	Tutorials	26
	Solving homework problems	45
	Personal study	37
	Final examination	3
Total number of hours for the Course (25 hours of work-load per ECTS credit)		150
STUDENT ASSESSEMENT <i>Description of the evaluation procedure</i> <i>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</i> <i>Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</i>	Assessment Language: Greek Assessment Language for Erasmus students: English Assessment methods Final exams (100%) including Theory and Exercises Minimum passing grade: 5 Maximum passing grade: 10	

5. RECOMMENDED LITERATURE

<p><i>(in Greek)</i></p> <ul style="list-style-type: none"> • Χρυσσαφινού Ουρανία. <i>Εισαγωγή στις Στοχαστικές Ανελίζεις</i>. 2^η Έκδοση, Εκδόσεις Σοφία, 2012. • Βασιλείου Παναγιώτης - Χρήστος. <i>Στοχαστικές Μέθοδοι στις Επιχειρησιακές Έρευνες</i>. Εκδόσεις Ζήτη, 2000. • Δάρας Τρύφων Ι. και Σύψας Παναγιώτης Θ. <i>Στοχαστικές Ανελίζεις</i>. Εκδόσεις Ζήτη, 2003. • Φακίνος Δημήτριος. <i>Εισαγωγή στις Πιθανότητες και τις Στοχαστικές Διαδικασίες</i>. Εκδόσεις Συμμετρία, 2011. • Καλπαζίδου Σοφία. <i>Στοιχεία Θεωρίας Στοχαστικών Ανελίζων</i>. Εκδόσεις Ζήτη, 1991. • Κάκουλλος Θεόφιλος Ν. <i>Στοχαστικές Ανελίζεις</i>. Εκδόσεις Συμμετρία, 1995. <p><i>(in English)</i></p> <ul style="list-style-type: none"> • Kulkarni Vidyadhar G. <i>Modeling and Analysis of Stochastic Systems</i>. CRC Press, 2010. • Ross Sheldon M. <i>Introduction to Probability Models</i>, 10th ed. Academic Press, 2009.
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