

COURSE OUTLINE

GENERAL

SCHOOL	School of Science		
ACADEMIC UNIT	Department of Mathematics		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	MAE532	SEMESTER	5th
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>		WEEKLY TEACHING HOURS	CREDITS
Lectures		3	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>	Specialised general knowledge		
PREREQUISITE COURSES:			
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes (in English, reading Course)		
COURSE WEBSITE (URL)	www.math.uoi.gr/~abatsidis/532.html		

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 term "stochastic" is used to describe phenomena in which some randomness inherent. A stochastic process is a probabilistic model that describes the behaviour of a system that randomly evolves over time. Observing the system at discrete points in time

(for instance at the end of each day or at the end of a time period, etc.) one gets a discrete time stochastic process. Observing the system continuously through time one gets a continuous time stochastic process. Objectives of the course are:

- a) Understanding the behaviour of a real system and based on its study to derive reliable results,
- b) a careful analysis of the model and the calculation of the results. A variety of classes of stochastic processes such as, the random walk, the Markov chains etc is used.

The student should be able to understand the meaning of the stochastic process, use the Markov processes for modelling systems and become familiar with their application, and be able to make various calculations and appropriate conclusions when the stochastic process describes a specific applied problem.

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?

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

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

SYLLABUS

Random Walk: Simple random walk, absorbing barriers, reflecting barriers. Markov Chains: General definitions, classification of states, limit theorems, irreducible chains. Markov Processes: The birth-death process. Applications

TEACHING and LEARNING METHODS - EVALUATION

DELIVERY <i>Face-to-face, Distance learning, etc.</i>	Classroom (face-to-face)
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY <i>Use of ICT in teaching, laboratory education, communication with</i>	<i>Use of ICT in communication with students</i>

<i>students</i>		
<p>TEACHING METHODS <i>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.</i></p> <p><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></p>	Activity	Semester workload
	Lectures	39
	Working independently	78
	Exercises-Homework	33
	Course total	150
<p>STUDENT PERFORMANCE EVALUATION <i>Description of the evaluation procedure</i></p> <p><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></p> <p><i>Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</i></p>	<p>Final written exam in Greek (in case of Erasmus students in English) which includes resolving application problems.</p>	

ATTACHED BIBLIOGRAPHY

- *Suggested bibliography:*

Books in English

Lawler. Introduction to Stochastic Processes

Ross. Introduction to probability models (Chapters 4, 6, 7)

Books in Greek:

Χρήστος Λάγκαρης. Θεωρία Στοχαστικών διαδικασιών. Πανεπιστημιακό Τυπογραφείο Ιωαννίνων.

Στοχαστικές Ανεξίξεις, Κάκουλλος Θεόφιλος

Στοχαστικές ανεξίξεις, Δάρας Τρύφων Ι., Σύψας Παναγιώτης Θ.

Στοχαστικές μέθοδοι στις επιχειρησιακές έρευνες, Βασιλείου Παναγιώτης - Χρήστος Μαθήματα στοχαστικών διαδικασιών Τ.Α., Αρτίκης Θεόδωρος Π.

- *Related academic journals:*
Stochastic Processes and their Applications