

COURSE OUTLINE

(1) GENERAL

SCHOOL	SCHOOL OF SCIENCES		
ACADEMIC UNIT	DEPARTMENT OF MATHEMATICS		
LEVEL OF STUDIES	UNDERGRADUATE PROGRAM		
COURSE CODE	311-0440	SEMESTER	H
COURSE TITLE	STOCHASTIC PROCESSES		
INSTRUCTOR			
INDEPENDENT TEACHING ACTIVITIES	WEEKLY TEACHING HOURS	CREDITS	
	4	6	
COURSE TYPE	Special Background		
PREREQUISITE COURSES:	NO		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	GREEK		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	YES		
COURSE WEBSITE (URL)	https://www.math.aegean.gr/index.php/en/education/undergraduate-programs		

(2) LEARNING OUTCOMES

Learning outcomes
The basic aim of the course is the understanding of random phenomena which evolve over time. These phenomena are studied using probability theory and constructing suitable mathematical models using families of random variables, i.e. using the stochastic processes. The constructed mathematical models satisfy appropriate properties. The basic kinds of stochastic processes such as among others, the Poisson process, the Markov chain, the Birth and Death process are presented and analyzed. For each stochastic process, we also provide plenty of its practical applications through suitable examples.
General Competences
Searching, analysis and composition of data and information using all the required technologies. Team and individual assignments. Assignments into a inter-academic environment. Promotion of free, creative and inductive thought.

(3) SYLLABUS

Basic elements of Probability theory, Moment generating functions, Vector random variables, Mean and variance of the sum of random variables, Covariance and correlation coefficient, Conditional Distributions, Conditional expectation, Limit Theorems, Limit of sequences of random variables, Introduction to Stochastic Processes, Markov chains in discrete time, Chapman-Kolmogorov equations, Classification of states, n-step transition probability matrix, Partition Theorem, Mean time of renewal, State diagram, Examples, Asymptotic results, Stationary distribution, Markov chains in continuous time, Poisson process, Kolmogorov forward equations, Distribution of inter-arrival times, Examples, Simple birth-death process, Branching process, The ruin problem of a gambler, State classification of random walk, Examples.	
TEACHING MATERIAL DISTRIBUTION	The teaching material of the course is uniformly distributed during the semester.

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY	Face-to-face lectures.	
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY	<ul style="list-style-type: none">• Communication with students via e-mail.• Uploading course material on moodle system .	
TEACHING METHODS	Activity	Semester workload
	Lectures	52
	Independent Study	98
	Course total (25 per ECTS)	150
COURSE COMMITMENTS	Attending course is not obligatory.	
STUDENT PERFORMANCE EVALUATION	Student's evaluation is done in Greek through a written examination. For students with disabilities, evaluation takes place via oral exams.	

(5) ATTACHED BIBLIOGRAPHY

<ol style="list-style-type: none">1. O. Chrisafinou, Introduction to Stochastic Processes, Sofia Editions.2. S. Kalpazidou, Elements of Stochastic Processes Theory, Ziti Editions. <p><i>-Suggested Foreign bibliography:</i></p> <ol style="list-style-type: none">1. Stochastic Processes, Sheldon Ross, Wiley.
