COURSE OUTLINE

(1) GENERAL

SCHOOL	SCHOOL OF SCIENCES		
ACADEMIC UNIT	DEPARTMENT OF MATHEMATICS		
LEVEL OF STUDIES	UNDERGRADUATE PROGRAM		
COURSE CODE		**SEMESTER**	**H**
COURSE TITLE	STOCHASTIC PROCESSES		
INSTRUCTOR	Michael Anousis		
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)	http://www.math.aegean.gr/index.php/en/academics/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
Search for, analysis and synthesis of data and information, with the use of the necessary methodology. Production of new research ideas. Production of free, creative and inductive thinking.

(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

USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY	Communication with students via e-mail
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 which includes short-answers questions and problem solving. For students with disabilities, evaluation takes place via oral exams.

(5) ATTACHED BIBLIOGRAPHY

1. Introduction to Stochastic Processes, O. Xrisafinou, Sofia Editions.

2. Elements of Stochastic Processes Theory, S. Kalpazidou, Ziti Editions.

-Suggested Foreign bibliography:

1. Stochastic Processes, Sheldon Ross, Wiley.