

COURSE OUTLINE

(1) GENERAL

SCHOOL	SCHOOL OF INFORMATION SCIENCES & TECHNOLOGY		
ACADEMIC UNIT	DEPARTMENT OF STATISTICS		
LEVEL OF STUDIES	1st Cycle (UNDERGRADUATE)		
COURSE CODE	6057	SEMESTER	7 th
COURSE TITLE	Stochastic Processes II		
INDEPENDENT TEACHING ACTIVITIES		WEEKLY TEACHING HOURS	CREDITS
Lectures		4	7
Workshops			
Labs		2	
COURSE TYPE	Elective		
PREREQUISITE COURSES:			
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	GREEK		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	YES		
COURSE WEBSITE (URL)	https://www.dept.aueb.gr/en/stat/content/stochastic-processes-ii-8-ects		

(2) LEARNING OUTCOMES

Learning outcomes
After successfully completing the course, students will be able to identify basic concepts of Stochastic Processes theory (martingale, Markov processes in continuous time and discrete and continuous state spaces, birth – death processes, infusion processes), to model and solve problems that require these techniques. They will be able to apply fundamental techniques from this theory focused on future applications in statistics and various cognitive objects related to economic sciences, finances, the environment and contemporary technologies.
General Competences
• Search, analysis and synthesis of data and information, using the necessary technologies • Adaptation to new situations • Autonomous work • Work in an interdisciplinary environment • Generation of new research ideas • Promotion of free, creative and inductive thinking

(3) SYLLABUS

Markovian processes in continuous time and discrete state space. Generators, forward and backward Kolmogorov functions. Calculating transition probabilities. Birth – death processes and applications. Markovian processes in discrete time with continuous state spaces.

Martingales in discrete time, stopping times, filtrations (intuitive). Optional Stopping Theorem. Stochastic procedures in continuous time. Brownian motion and its properties. Geometric Brown motion and the Ornstein-Uhlenbeck process. Gaussian processes. Introduction to the stochastic integral. Simulating stochastic processes. Applications in economics, finance, environment and contemporary technologies.

Knowledge of Stochastic Processes I is necessary.

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY <i>Face-to-face, Distance learning, etc.</i>	Face-to-face		
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY	In Teaching	Yes	
	In Labs	Yes	Software simulating stochastic processes and systems
	In communicating with the students	Yes	Email and eclass.
TEACHING METHODS	Activity		Semester workload
	Lectures		45
	Studying and Analyzing Bibliography		34
	Self Study		96
	Course Total		175
STUDENT PERFORMANCE EVALUATION	Written examination at the end of the semester: 70% Home Assignment: 10% Project: 20% Information is available at eclass		

(5) ATTACHED BIBLIOGRAPHY

• Κουμουλλής Γ. Χ., Νεγρεπόντης Σ., Θεωρία Μέτρου, Εκδόσεις Συμμετρία, 2005. • Karlin S., Taylor H. M. (1981). A second course in stochastic processes, Academic Press. • Rogers L. C., Williams D. (2000). Diffusions, Markov processes and Martingales: Volume I, Foundations. Cambridge University press. • Revuz D., Yor M. (2004). Στοιχηματικές στοχαστικές διαδικασίες συνεχούς χρόνου και κίνηση Brown (ελληνική μετάφραση), Leaders Books. • Χρυσάφινου Ουρανία (2008) Εισαγωγή στις Στοχαστικές Ανελιξεις. Εκδόσεις Σοφία. • Karlin S. and H. Taylor (1975). A First Course in Stochastic Processes, Academic Press. • Grimmett, G.R. and D.R. Stirzaker (2001). Probability and Random Processes. Oxford University Press. • Steele, M.J. (2001). Stochastic Calculus and Financial Applications. Springer.	
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