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**	**7th**
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-7-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. Markjovian 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

<table>
<tr><td>DELIVERY
Face-to-face, Distance learning, etc.</td><td colspan="3">Face-to-face</td></tr>
<tr><td>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY</td><td colspan="3"><table>
<tr><td>In Teaching</td><td>Yes</td><td></td></tr>
<tr><td>In Labs</td><td>Yes</td><td>Software simulating stochastic processes and systems</td></tr>
<tr><td>In communicating with the students</td><td>Yes</td><td>Email and eclass.</td></tr>
</table></td></tr>
<tr><td>TEACHING METHODS</td><td colspan="3"><table>
<tr><th>Activity</th><th>Semester workload</th></tr>
<tr><td>Lectures</td><td>45</td></tr>
<tr><td>Studying and Analyzing Bibliography</td><td>34</td></tr>
<tr><td>Self Study</td><td>96</td></tr>
<tr><td>Course Total</td><td>175</td></tr>
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<tr><td>STUDENT PERFORMANCE EVALUATION
.</td><td colspan="3">Written examination at the end of the semester: 70%
Home Assignment: 10%
Project: 20%

Information is available at eclass</td></tr>
</table>

(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.
- Χρυσαφίνου Ουρανία (2008) Εισαγωγή στις Στοχαστικές Ανελίξεις. 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.