COURSE OUTLINE

(1) GENERAL

SCHOOL	SCHOOL OF SCIENCES			
ACADEMIC UNIT	DEPARTMENT OF MATHEMATICS			
LEVEL OF STUDIES	POSTGRADUATE **Studies in Mathematics**			
COURSE CODE	**B7**	**SEMESTER**	**B**	
COURSE TITLE	STOCHASTIC MODELING			
INDEPENDENT TEACHING ACTIVITIES		**WEEKLY TEACHING HOURS**	**CREDITS**	
		3	10	
COURSE TYPE	SPECIALISED GENERAL KNOWLEDGE			
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 aims of Stochastic Modeling are: (a) To transmit the basic ideas of Stochastic Modeling and to show how these ideas can be used in various models in applied and in theoretical level. (b) To reveal the interaction between two scientific areas which usually are presented as two separately scientific fields: Stochastic Processes and Stochastic Modeling. (c) To reveal the importance of stochastic models through their construction and their analysis in various scientific areas.
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

Introduction to stochastic processes. Basic elements. Chapman-Kolmogorov equation. Markov chains in discrete-time and in continuous time. Poisson Process. Birth-Death process. Examples. Introduction to Stochastic Dynamic Programming. Markov decision process in discrete-time. Finite-horizon models. Policies and Stationary policies. Optimality criteria. Minimization of the total expected cost. Discounted Dynamic Programming. Infinite-Horizon Models. Minimization of the total discounted expected costs. Epidemic models. Optimal machine maintenance models. Minimization of the long-run expected average cost. The policy-iteration algorithm. The method of successive approximations. Introduction to the Queueing Systems. Systems $M/M/1$, $M/M/1/K$ και $M/M/m$ and their modifications.

(4) TEACHING and LEARNING METHODS - EVALUATION

<table>
<tr><td>DELIVERY</td><td>Face-to-face</td></tr>
<tr><td>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY</td><td>• Communication with students via e-mail
• Uploading course material on moodle system</td></tr>
<tr><td>TEACHING METHODS</td><td>
<table>
<tr><th>Activity</th><th>Semester workload</th></tr>
<tr><td>Lectures</td><td>39</td></tr>
<tr><td>Independent study</td><td>148.5</td></tr>
<tr><td>Assignments</td><td>62.5</td></tr>
<tr><td>Course total (25 per ECTS)</td><td>250</td></tr>
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<tr><td>STUDENT PERFORMANCE EVALUATION</td><td>Student evaluation is done in Greek through a written examination which includes short-answer equations and problem solving.
For students with disabilities, evaluation takes place via oral exams.</td></tr>
</table>

(5) ATTACHED BIBLIOGRAPHY

1. Introduction to Stochastic Dynamic Programming, S.M. Ross, Academic Press.
2. Markov Decision Processes: Discrete Stochastic Dynamic Programming, M.L. Puterman, Wiley.
3. Stochastic Dynamic Programming and the Control of Queueing Systems, L.I. Sennott, Wiley.
4. A First Course in Stochastic Models, H.C. Tijms, Wiley.