COURSE OUTLINE

Ημερομηνία: 8 Νοε 2022

A. INFORMATION FOR THE COURSE

A1. School	School of Science and Technology of Information
A2. Department	Department of Statistics
A3. Master Programme	
A4. Course Code	6143
A5. Title of the Course	MATHEMATICAL METHODS

Lecturers

Name	Rank	Specialization
ZAZANIS MICHAEL	Professor	Applied Probability - Operations Research

B. TYPE OF COURSE

B1. Year of Study	2
B2. Semester	4th
B3. Level of Course (if applicable)	1st Cycle
B4. Type of course	Elective
B5. Field	Specific Background
B6. ECTS credits allocated (ECTS)	7.00
B7. Is the Course in the Syllabus?	Yes
B8. If yes, which is the reference Page?	29-68
B9. Is there a site for the course?	Yes https://www.dept.aueb.gr/el/stat-courses

C. INSTRUCTION

C1. Lectures Include:	Classroom lectures: Yes Distance learning lectures: No Seminars: No Laboratory exercises: No Field training exercise: No Literary analysis: No Tutorial: Yes Interactive teaching: No Educational visits: No Project: No Essays/reports: Yes Independent study: Yes Lectures given by scientists: No Internship: No
C2. Scheduled Hours for Lectures per week	4.00
C3. Scheduled Hours for Tutorials per week	2.00
C4. Scheduled Hours for Workshops per week	
C5. Scheduled Hours for Case Studies per week	
C6. Scheduled Hours for Other Activities per week	
C7. Scheduled Hours for Lectures per semester	52
C8. Scheduled Hours for Tutorials per semester	24
C9. Scheduled Hours for Workshops per semester	
C10. Scheduled Hours for Case Studies per semester	
C11. Scheduled Hours for Other Activities per semester	
C12. Mode of Delivery	Face to Face
C13. Student’s Evaluation	Written examination at the end of the semester: Yes Oral examination: No Midterm exam: No Homework: No Project: No Public Presentation: No Laboratory exercises: No Practical exercises: No Exempt work: No

C14. Language of Instruction	Greek

D. PREREQUISITE COURSES

Μαθηματικός Λογισμός Ι, Μαθηματικός Λογισμός ΙΙ, Γραμμική Άλγεβρα.

E. COURSE CONTENTS (Syllabus)

Positive and negative definite matrices, local extrema of functions of many variables. Optimization with equality constraints and Lagrange multipliers. The spectral theorem for symmetric matrices and related concepts. The Cayley—Hamilton theorem and the Jordan decomposition. Linear differential equations with constant coefficients and systems of linear differential equations. The matrix exponential. The Rayleigh quotient and the minimax characterization of the eigenvalues of a symmetric matrix. Introduction to convexity and the separating hyperplane theorem. Farkas' lemma. Linear Programming and duality. Complementary slackness. Optimization under inequality constraints. The Kuhn—Tucker conditions.

F. LEARNING OUTCOMES

Develop a deeper understanding of linear spaces and their use in the solution of linear differential equations and systems. Develop the ability to use these techniques in the modelling and analysis of stochastic systems. Study linear and non linear optimization problems with constraints and the the use of optimization techniques in Probability and Statistics.

G. LITERATURE

G1. Use of Multiple Literature	Yes
G2. Recommended or required reading	Yes