

COURSE MODULE OUTLINE

1. GENERAL INFORMATION

SCHOOL	SCHOOL OF SCIENCE AND TECHNOLOGY		
PROGRAM COURSE	MASTER IN MATHEMATICS		
LEVEL OF STUDY	POSTGRADUATE		
COURSE UNIT CODE	MSM70	YEAR OF STUDY	1 st
COURSE TITLE	FUNDAMENTAL THEORIES AND METHODS IN MATHEMATICS		
INDEPENDENT TEACHING ACTIVITIES <i>in case credits are awarded for separate components/parts of the course, e.g. in lectures, laboratory exercises, etc. If credits are awarded for the entire course, give the weekly teaching hours and the total credits</i>		HOURS	CREDITS
Weekly workload in hours: 24-25 x 32 weeks		840 h	30
<i>Add rows if necessary. The organization of teaching and the teaching methods used are described in detail under section 4</i>			
COURSE TYPE Compulsory, Optional, Optional mandatory	Compulsory		
PREREQUISITE COURSES:	There are no prerequisites for this course		
LANGUAGE OF INSTRUCTION AND EXAMS:	Greek		
THE COURSE IS OFFERED TO ERASMUS STUDENTS	No (due to the one academic year duration of the module).		
COURSE WEBSITE (URL)	https://www.eap.gr/education/postgraduate/annual/postgraduate-studies-in-mathematics/topics/#m70 Each module has its own space in the Learning Management System of EAP(http://study.eap.gr), with controlled access (use of code) for students and teaching staff.		

(2) LEARNING OUTCOMES

Learning Outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate (certain) level, which students will acquire upon successful completion of the course, are described in detail. It is necessary to consult:

APPENDIX A

- Description of the level of learning outcomes for each level of study, in accordance with the European Higher Education Qualifications' Framework.
- Descriptive indicators for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and

APPENDIX B

- Guidelines for writing Learning Outcomes

Upon successful completion of the module MSM70 "Fundamental Theories and Methods in Mathematics", students will have developed the following skills:

- Knowledge and understanding of the fundamental topological properties of Metric Spaces, such as convergence, continuity, completeness, connectedness and compactness,
- Knowledge and understanding of the fundamental theorems of Linear Algebra, in particular the theorems concerning the structure and properties of finite-dimensional vector spaces, linear transformations, matrices, and linear systems of equations,
- Ability to utilize the tools of Linear Algebra in modelling physical problems,
- Ability to implement the aforementioned tools to solve linear systems of differential equations, study Markov chains, and in linear programming,
- Knowledge of the fundamental concepts of Probability Theory and discrete random variables, and the ability to apply the theory in modeling physical problems,
- Ability to make calculations using the forenamed mathematical tools

General Learning Outcomes: Upon successful completion of MSM70, students will have obtained the following:

- Comprehension of the basic mathematical theories,
- Attainment of the necessary mathematical knowledge to successfully participate in the other thematic units of the curriculum

General Competences

Taking into consideration the general competences that students/graduates must acquire (as those are described in the Diploma Supplement and are mentioned below), at which of the following does the course attendance aim?

<i>Search for, analysis and synthesis of data and information by the use of appropriate technologies,</i>	<i>Respect for diversity and multiculturalism</i>
<i>Adapting to new situations</i>	<i>Environmental awareness</i>
<i>Decision-making</i>	<i>Social, professional and ethical responsibility and sensitivity to gender issues</i>
<i>Individual/Independent work</i>	<i>Critical thinking</i>
<i>Group/Team work</i>	<i>Development of free, creative and inductive thinking</i>
<i>Working in an international environment</i>	
<i>Working in an interdisciplinary environment</i> (Other.....citizenship, spiritual freedom, social Introduction of innovative research awareness, altruism etc.)	

Search for, analysis and synthesis of data and information by the use of appropriate technologies.
Adapting to new situations.
Decision-making.
Individual/Independent work.
Project planning and management.
Critical thinking.
Development of free, creative and inductive thinking.

(3) COURSE CONTENT

The objective of the module MSM70 is to teach fundamental mathematical knowledge and techniques from Analysis, Linear Algebra, Probability Theory, and Statistics, in order for students to obtain the necessary foundations to successfully participate in the thematic units of the second term of studies. Lessons will focus on fundamental mathematical principles and familiarization with calculations.

Cognitive Subjects of the module:

- Real Analysis
- Linear Algebra
- Elements of Stochastic Mathematics

In particular, the curriculum of MSM70 includes the following topics:

Metric spaces (topology of metric spaces, sequences, continuity). Complete metric spaces. Fixed point theorems. Completion of metric spaces. Normed vector spaces. Matrices. Eigenvalues - Eigenvectors. Linear Systems. Probability. Conditional probability and independence. Discrete random variables.

(4) TEACHING METHODS--ASSESSMENT

<p>MODES OF DELIVERY <i>Face-to-face, in-class lecturing, distance teaching and distance learning etc.</i></p>	<p>Distance education with five Group Counseling Meetings (OSS) during the academic year on weekends.</p>	
<p>USE OF INFORMATION AND COMMUNICATION TECHNOLOGY <i>Use of ICT in teaching, Laboratory Education, Communication with students</i></p>	<p>Remote meetings tools (cisco webex), digital writer, and pdf presentations.</p>	
<p>COURSE DESIGN <i>Description of teaching techniques, practices and methods: Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, Internship, Art Workshop, Interactive teaching, Educational visits, projects, Essay writing, Artistic creativity, etc.</i></p> <p><i>The study hours for each learning activity as well as the hours of selfdirected study are given following the principles of the ECTS.</i></p>	<p>Activity/Method</p>	<p>Annual workload</p>
	<p>6 OSS</p>	<p>24 h</p>
	<p>6 assignments</p>	<p>180 h</p>
	<p>Examination</p>	<p>6 h</p>
	<p>Individual study</p>	<p>630 h</p>
	<p>Total</p>	<p>840</p>
<p>STUDENT PERFORMANCE EVALUATION/ASSESSMENT METHODS <i>Detailed description of the evaluation procedures:</i></p> <p><i>Language of evaluation, assessment methods, formative or summative (conclusive), multiple choice tests, short- answer questions, open-ended questions, problem solving, written work, essay/report, oral exam, presentation, laboratory work, other.....etc.</i></p> <p><i>Specifically defined evaluation criteria are stated, as well as if and where they are accessible by the students.</i></p>	<p>Elaboration of written assignments during the academic year, the average of the grades of which participates in the formation of the final grade of the module by 30%, under the condition of passing to the stage of the final examinations. The condition for passing to the stage of final examinations is the submission of 5/6 written assignments with grade 50/100. In the final written examinations the grade of the written assignments participates in the formation of the final grade of module by 70%.</p> <p>All the criteria are posted, both in each written assignment (in the LMS study.eap.gr), as well as in the general regulation of HOU at: https://www.eap.gr/education/study-regulations/</p>	

(5) SUGGESTED BIBLIOGRAPHY:

- *Suggested bibliography.*

- Ross S., Βασικές Αρχές Θεωρίας Πιθανοτήτων, επιμ. Φελουζής Β., 8η Αμερικανική Έκδοση, Κλειδάριθμος 2011.
- Strang, G., Γραμμική Άλγεβρα και Εφαρμογές, επ. Π. Πάμφιλος, Πανεπιστημιακές Εκδόσεις Κρήτης, 2η έκδοση 2021
- Carothers, N.L., Real Analysis, Cambridge University Press, Cambridge 2000.

- *Related scientific Journals:*

- Transactions of the AMS.
- Proceedings of the AMS
- Advances in Mathematics.
- International Journal of Mathematics.
- Journal of Linear Algebra and its Applications.
- Journal of Theoretical Probability.