COURSE OUTLINE

1. GENERAL

SCHOOL	NATURAL SCIENCES		
DEPARTMENT	MATHEMATICS		
LEVEL OF COURSE	UNDERGRADUATE		
COURSE CODE	MAT_DI434	**SEMESTER OF STUDIES**	8th
COURSE TITLE	PROBLEM SOLVING		

INDEPENDENT TEACHING ACTIVITIES *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits*	**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
Lectures and Tutorials	4	6
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	Elective course
PREREQUISITE COURSES:	Recommended prerequisite knowledge: ANALYTIC GEOMETRY, INTRODUCTION TO ALGEBRA AND SET THEORY, DISCRETE MATHEMATICS, CALCULUS I and II, NUMBER THEORY
TEACHING AND ASSESSMENT LANGUAGE:	Greek
THE COURSE IS OFFERED TO ERASMUS STUDENTS	Yes
COURSE WEBPAGE (URL)	

2. LEARNING OUTCOMES

Learning outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.

Consult Appendix A

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning*

and Appendix B

- *Guidelines for writing Learning Outcomes*

The main scope of this course is to employ students to "do mathematics" instead of just reading mathematics and applying algorithmic procedures. At first, the problems (tak-environments) students are confronted with give them the opportunity to think thoroughly about certain mathematical concepts (Problem Solving Ancillary to a Concept). The tasks are formulated either in a pure mathematical environment or in a "pseudo realistic" one; so the students gain experience in "mathematization" and "modeling" (that involves the use of functions as tools in solving). Another target of the course is to help students to develop metacocnitive skills. Nurturing the above aspects of mathematical work students become cognizant of the mathematical structure underlying the tasks they handle, a major goal of the mathematical development.

General Abilities

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology	*Project planning and management*
Adapting to new situations	*Respect for difference and multiculturalism*
Decision-making	*Respect for the natural environment*
Working independently	*Showing social, professional and ethical responsibility and sensitivity to gender issues*
Team work	*Criticism and self-criticism*
Working in an international environment	*Production of free, creative and inductive thinking*
Working in an interdisciplinary environment	*Others…*
Production of new research ideas	

- Autonomous work in Mathematics.
- Collaborative work in Mathematics.
- Developing creative and deductive thinking.

3. COURSE CONTENT

Problem Solving in Mathematics as a learning and research agenda. Heuristics, the legacy of Polya. Mental Argumentation in Mathematics. Executive Control (Self-regulation) in Problem Solving. Accessing knowledge for Problem Solving. Mathematization/Modeling. Multiple Solutions Tasks. Problem Posing. Differentiation between Problem Solving and Proof. The study of mathematical texts as a problem-solving process.

4. TEACHING AND LEARNING METHODS - ASSESSMENT

TEACHING METHOD *Face-to-face, Distance learning, etc*	Lectures (face to face)
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES *Use of ICT in teaching, laboratory education, communication with students*	
TEACHING ORGANIZATION *The manner and methods of teaching are described in detail.* *Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	

Activity	***Semester workload***
Lectures	55
Study (at their own)	80
Presentation and Discussion of Projects	12
Final Exam	3
Total number of hours for the Course (25 hours of work-load per ECTS credit)	***150***

STUDENT ASSESSEMNT *Description of the evaluation procedure* *Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Specifically-defined evaluation criteria are given, and if and where they are accessible to students*	**Assessment Language:** Greek **Assessment Language for Erasmus students:** English **Assessment methods:** ✓ Final exam ✓ Project performance Minimum passing grade: 5 Maximum passing grade: 10

5. RECOMMENDED LITERATURE

(*in Greek*)

- Μαμωνά-Downs Γιάννα και Παπαδόπουλος Ιωάννης. *Επίλυση Προβλήματος στα Μαθηματικά*. Εκδόσεις ΙΤΕ – Πανεπιστημιακές Εκδόσεις Κρήτης, 2017.
- Polya Gyorgy. *Πώς να το λύσω*. 3η Έκδοση, Εκδόσεις Καρδαμίτσα, 1998.