

COURSE OUTLINE

1. GENERAL

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|---|---|----------------------------|-----------------|
| SCHOOL | NATURAL SCIENCES | | |
| DEPARTMENT | MATHEMATICS | | |
| LEVEL OF COURSE | UNDERGRADUATE | | |
| COURSE CODE | MAT_DI363 | SEMESTER OF STUDIES | 6 th |
| COURSE TITLE | LEARNING AND FORMATION OF MATHEMATICAL KNOWLEDGE | | |
| INDEPENDENT TEACHING ACTIVITIES <i>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</i> | TEACHING HOURS PER WEEK | ECTS CREDITS | |
| Lectures and Tutorials | 4 | 6 | |
| <i>Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).</i> | | | |
| COURSE TYPE <i>general background, special background, specialised general knowledge, skills development</i> | Elective course | | |
| PREREQUISITE COURSES: | <u>Recommended prerequisite knowledge:</u> ANALYTIC GEOMETRY, INTRODUCTION TO ALGEBRA AND SET THEORY, DISCRETE MATHEMATICS, CALCULUS I and II | | |
| TEACHING AND ASSESSMENT LANGUAGE: | Greek | | |
| THE COURSE IS OFFERED TO ERASMUS STUDENTS | No | | |
| COURSE WEBPAGE (URL) | | | |
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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 students following this course will have the opportunity to study (and reconsider) fundamental issues of Mathematics from an Advanced viewpoint. The course focuses on the following topics: Systems of Numbers and Numbering Systems. The Continuum of the Reals and its realization in the Decimals. The main Concepts of Analysis (focusing on the notion of Function and the one of Limit). Students' conceptualization of the above notions as delineated in the research of Mathematics Education. Visualization and Proof in Geometry.

Expected outcome of the study: first the students to become cognizant of the ways learners' mathematical knowledge evolves; second to reflect and reconsider their own conceptual images and mathematical understanding of pertinent concepts and topics in mathematics, especially those that constitute the transition to abstract mathematics.

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

Adapting to new situations

Decision-making

Working independently

Team work

Working in an international environment

Working in an interdisciplinary environment

Production of new research ideas

Project planning and management

Respect for difference and multiculturalism

Respect for the natural environment

Showing social, professional and ethical responsibility and sensitivity to gender issues

Criticism and self-criticism

Production of free, creative and inductive thinking

Others...

- Collaborative work.
- To study and work in an international environment.
- To develop creative and deductive thinking.

3. COURSE CONTENT

Epistemology and Cognition of Mathematical Knowledge. The development of the Systems of Numbers and the Numbering Systems in Mathematics Education (From the Natural Numbers to the Limiting Processes and the Completeness of \mathbb{R}). Anatomy of the notions of Function and Limit. Aspects of the learning of Geometry (Van Hiele Levels, Visualization and the 3D v 2D paradigm). The Construction of Definitions and their role in the development of mathematical theories. Study of theoretical frameworks as Concept Image / Concept Definition, APOS. Advanced Mathematical Thinking (AMT): the introduction to Abstraction and the paradigm of Real Analysis.

4. TEACHING AND LEARNING METHODS - ASSESSMENT

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| <p>TEACHING METHOD <i>Face-to-face, Distance learning, etc.</i></p> | Lectures (face to face) | |
| <p>USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES <i>Use of ICT in teaching, laboratory education, communication with students</i></p> | | |
| <p>TEACHING ORGANIZATION <i>The manner and methods of teaching are described in detail.</i></p> <p><i>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.</i></p> <p><i>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</i></p> | 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 | |
| <p>STUDENT ASSESSEMENT <i>Description of the evaluation procedure</i></p> <p><i>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</i></p> <p><i>Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</i></p> | <p>Assessment Language: Greek Assessment Language for Erasmus students: ---</p> <p>Assessment methods: ✓ Final exam ✓ Project performance</p> <p>Minimum passing grade: 5 Maximum passing grade: 10</p> | |

5. RECOMMENDED LITERATURE

(in Greek)

- Πατρώνης Τάσος και Σπανός Δημήτριος (2013). *Σύγχρονες Θεωρήσεις και Έρευνες στη Μαθηματική Παιδεία*. Εκδόσεις Α.Γ. Πνευματικός.
- Research papers on the subject matter (in English) provided by the lecturer.