COURSE OUTLINE

1. GENERAL

SCHOOL	NATURAL SCIENCES		
DEPARTMENT	MATHEMATICS		
LEVEL OF COURSE	UNDERGRADUATE		
COURSE CODE	MAT_PM102	**SEMESTER OF STUDIES**	1st
COURSE TITLE	INTRODUCTION TO ALGEBRA AND SET THEORY		

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	5	8
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*	Background
PREREQUISITE COURSES:	
TEACHING AND ASSESSMENT LANGUAGE:	Greek
THE COURSE IS OFFERED TO ERASMUS STUDENTS	No
COURSE WEBPAGE (URL)m	

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*

With this course, students are expected to be able to use the language and techniques of the algebra of sets, the induction method, the divisibility of integers and polynomials and the techniques of arithmetic mod n in various problems.

After the successful completion of the course, students will have been in systematic contact with the algebra of sets, the integers, the rational, the real and the complex numbers, with the most basic properties of integer and polynomial arithmetic as well as with the notions of countability and the existence of uncountable sets.

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	

- Search, analysis and synthesis, as well as a critical understanding of data and information using appropriate technologies.
- Decision making.
- Working in an interdisciplinary environment.
- Autonomous Work.
- Teamwork.
- Production of new research ideas.
- Promotion of free, creative and inductive thinking in mathematics.

3. COURSE CONTENT

Introduction to Set Theory. Sets, naïve definition, description, subsets, power set. Algebra of sets. Infinite unions and intersections, examples (examples of subsets of the real line). Cartesian product. Binary relations, functions, composition of functions, one-to-one functions, reversible functions, line and inverse image of subset, lines and inverse images of unions and intersections. Equivalence relations, Equivalence classes, set-quotient, partitions, order relations. Countability, countability of NxN, uncountability of real numbers, algebraic and transcendent numbers.
Introduction to Number Theory. The set of natural numbers. Standard and strong induction, well-ordering principle. The Euclidean division, the greatest common divisor, the least common multiple, prime numbers, the fundamental theorem of arithmetic, equivalence relation mod n, equivalence classes and their algebra.
Introduction to the field of Complex Numbers. Complex plane, algebra and modulus of complex numbers, polar form and roots of unity.
Polynomials: Division, factorization, roots of polynomials.

In order to highlight the special educational and didactical aspects of a course, special emphasis is given on the historical evolution and scientific development of the subject as well as on its applications in technology and/or other sciences.

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*	
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:** --- **Assessment methods** Written Final Course Examination (100%) including ✓ Theory, ✓ Exercises. Minimum passing grade: 5 Maximum passing grade: 10

Activity	*Semester workload*
Lectures	39
Tutorials	26
Solving suggested exercises	52
Hours of personal study by the student	80
Final examination	3
Total number of hours for the Course (25 hours of work-load per ECTS credit)	***200***

5. RECOMMENDED LITERATURE

(in Greek)

- Τσολομύτης Αντώνης. *Σύνολα και Αριθμοί. Μια εισαγωγή στα Μαθηματικά*. Εκδόσεις LEADER BOOKS, 2004.
- Στρατηγόπουλος Δημήτριος. *Σύγχρομη Άλγεβρα Ι*. Εκδόσεις Συμμετρία, 1997.
- Λεγάτος Γεράσιμος και Παπαδόπουλος Στ. Νίκος (επιμέλεια: Πατρώνης Αναστάσιος). *Άλγεβρα και Στοιχεία από τη Μαθηματική Ανάλυση*. 2η Έκδοση, Εκδόσεις Gutenberg, 2016.
- Γεωργίου Δημήτριος και Ηλιάδης Σταύρος. *Θεωρία Συνόλων*. 2η Έκδοση, Εκδόσεις Τζιόλα, 2017.