



Course Syllabus

Course Code	Course Title	ECTS Credits
MATH-186	Elementary Number Theory	6
Prerequisites	Department	Semester
MATH-185	Computer Science	Fall/Spring
Type of Course	Field	Language of Instruction
Required	Mathematics	English/Greek
Level of Course	Lecturer(s)	Year of Study
1 st Cycle	Dr. George Chailos	1 st
Mode of Delivery	Work Placement	Corequisites
Face to Face	NA	None

Course Objectives:

The main objectives of the course are to:

- Give insight into elementary number theoretic concepts and advance ability in their use.
- Familiarize students with how integers are constructed from prime numbers and their distribution amongst the integers.
- Cover congruences and linear diophantine equations in depth.
- Prove the Chinese Remainder Theorem and Fermat's little Theorem
- Cover certain important number theoretic functions, e.g. the Euler phi-function
- Familiarize students with the arithmetic of Arithmetic of Z_p and congruences with prime-power modulus
- Cover the group of Units

Learning Outcomes:

After completion of the course students are expected to be able to:

1. Demonstrate familiarity with the concepts and connections of the course content.
2. Perform calculations with congruences and solve linear Diophantine equations
3. Verbally describe and have conversations about the concepts, connections and solution methods in number theory
4. Use number theoretic functions such as the Euler phi-function.
5. Implement Chinese Remainder Theorem.
6. Apply primality tests
7. Perform computations with continued fractions and to use these in order to solve Pell's equation.

Course Content:

1. Linear systems and Matrices
 - General theory of Linear systems.
 - Theory and properties of Matrices, Invertibility of Matrices, Determinant of a Matrix.
2. Vectors and Linear Transformations
 - Vectors in the plane and n – vectors.
 - Introduction to the theory of linear Transformations.
3. Vector Spaces
 - Vector spaces and subspaces.
 - The basis and the dimension of a vector space.
 - The Rank of a Matrix and its applications.
4. Further theory of square Matrices
 - Eigenvalues and Eigenvectors of square matrices.
 - Diagonalization of Matrices.

Learning Activities and Teaching Methods:

Lectures, Exercises, Assignments and Tests.

Assessment Methods:

Midterm Examination, Final Examination, Homework Assignments

Required Textbooks / Readings:

Title	Author(s)	Publisher	Year	ISBN
Elementary Linear Algebra	B. Kolman and D. Hill	Pearson 9 th Ed.	2017	9780134718538

Recommended Textbooks / Readings:

Title	Author(s)	Publisher	Year	ISBN
Linear Algebra and its Applications	S. Lay and J. McDonald	Pearson 5 th Ed.	2015	9780321982384