



<b>Course Code</b> MATH-186	<b>Course Title</b> Elementary Number Theory	<b>ECTS Credits</b> 8
<b>Department</b> Computer Science	<b>Semester</b> Fall, Spring	<b>Prerequisites</b> MATH-185
<b>Type of Course</b> Elective	<b>Field</b> Mathematics	<b>Language of Instruction</b> English
<b>Level of Course</b> 1 <sup>st</sup> Cycle	<b>Year of Study</b> 1 <sup>st</sup>	<b>Lecturer(s)</b> Dr Florent Domenach
<b>Mode of Delivery</b> Face-to-face	<b>Work Placement</b> N/A	<b>Co-requisites</b> None

### Objectives of the Course:

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.
- Cover certain important number theoretic functions, e.g. the Euler phi-function
- Discuss the Möbius inversion formula and its application Present some simple primality tests
- Cover the law of quadratic reciprocity
- Discuss continued fractions in detail Cover Gaussian integers and their applications.

### 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 the Möbius inversion formula
6. Apply primality tests
7. Perform computations with continued fractions and to use these in order to solve Pell's equation
8. Utilize Gaussian integers to write integers as sums of two squares

### Course Contents:

1. Integer Representations and Operations.
2. Primes and Greatest Common Divisors.

3. Congruences.
4. Applications of Congruences.
5. Multiplicative Functions.
6. Cryptology.
7. Primitive Roots.
8. Quadratic Residues.
9. Decimal Fractions and Continued.
10. The Gaussian Integers.

**Learning Activities and Teaching Methods:**

Lectures, Exercises, Assignments and Tests.

**Assessment Methods:**

2 Mid-Term Exams; Final Exam; Class Participation.

**Required Textbooks/Reading:**

Authors	Title	Publisher	Year	ISBN
Kenneth H. Rosen	Elementary Number Theory	Addison-Wesley	2010	0321237072

**Recommended Textbooks/Reading:**

Authors	Title	Publisher	Year	ISBN
George E. Andrews	Number Theory	Dover Publications	1994	978-0486682525