

Fundamental Mathematics

Code: 100089
ECTS Credits: 9

Degree	Type	Year	Semester
2500149 Mathematics	OB	1	1

Contact

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Use of languages

Principal working language: catalan (cat)
Some groups entirely in English: No
Some groups entirely in Catalan: Yes
Some groups entirely in Spanish: No

Teachers

Pere Ara Bertrán
Laia Saumell Ariño
Francesc Perera Domènech
Wolfgang Pitsch

Prerequisites

Appart from a good understandic of basic notions in arithmetic and some skill in handling algebraic expressions, no prerequisites are needed for this course. Nonetheless it is basic to have the will to undertand the mathematical arguments, the logic and to sharpen one's critical thinking.

Objectives and Contextualisation

In the first part of the course we will introduce the basic language of mathematics. A great deal of time will be dedicated to getting to handle this new language correctly, as it is essential to understand, produce and share mathematics.

Particular stress will be put on the logic arguments (implication, equivalence, contraposition). The student will get acquainted to these through the diverse themes of the course: basic set theory, arithmetic, polynomials, etc.

Content

1. Set theory

Complex numbers
Basic language of sets.
Peano Axioms. Induction.
Maps between sets. Equivalence and order relations. Quotient set.
Permutations. Decomposition in disjoint cycles, order and sign.

2- Combinatorics

Finite vs infinite sets.

(Un)Ordered selections, with and without repetition.

Binomial formula.

Inclusion-exclusion principle.

3. Integers and congruences

Euclidean division. Greatest common divisor and least common multiple. Bézout Identity.

Diophantine Equations.

Prime and coprime numbers. Factorization.

Congruences. Euler and Fermat theorems. Chinese remainder theorem.

4. Polynomials

Euclidian division in polynomials. Greatest common divisor and least common multiple. Bézout Identity.

Irreducible polynomials and coprime polynomials. Factorization into irreducibles.

Roots.