

27004 - Numbers and Sets

Syllabus Information

Academic year: 2023/24

Subject: 27004 - Numbers and Sets

Faculty / School: 100 - Facultad de Ciencias

Degree: 453 - Degree in Mathematics

ECTS: 6.0

Year: 1

Semester: First semester

Subject type: Basic Education

Module:

1. General information

Numbers and Sets is a basic course in the Degree of Mathematics. The main objective of this course is to lead the student to learn the basic mathematical language and methods. Language and methods will be useful in all the subjects of the Degree.

We study the first properties of natural numbers, integers, rational numbers (density), real numbers (completeness) and complex numbers (geometric representation). Also, proof methods are introduced and practiced: reductio ad absurdum, induction principle. Modular arithmetic and its applications are introduced, as well as the language of sets, applications among them and order and equivalence relations.

The approaches and objectives of this module are aligned with the Sustainable Development Goals (SDGs) of the United Nations 2030 Agenda; the learning activities could contribute to some extent to the achievement of the goals 4 (quality education), 5 (gender equality), 8 (decent work and economic growth), and 10 (reducing inequality).

2. Learning results

- Make proper use of the language and the basic properties of set theory, and its applications.
- Make proper use of natural numbers, the induction principle, and the basic combinatorial arguments.
- Know how to compute the greatest common divisor and the Bézout identity in integers and polynomials.
- Have knowledge about the factorization of integer numbers and polynomials.
- Be familiar with modular arithmetic.
- Make proper use of complex numbers and their geometric representation.

3. Syllabus

- Natural numbers and induction principle. Basic combinatorics.
- Integer numbers, rationals and reals. Axiomatic formulation. The supremum axiom.
- Complex numbers. Geometrical representation (the complex plane). Operations. Roots of the unity.
- Language and basic properties of sets and maps. Equivalence relations and order relations.
- Cardinality. Countable and uncountable sets.
- Integer numbers. Greatest common divisor. Euclidean algorithm. Bézout identity and linear Diophantine equations. Modular arithmetic.
- Polynomials. Factorization. Quotients of polynomials

4. Academic activities

Master classes: 45 hours.

Problem solving: 15 hours.

Study: 83 hours.

Assessment tests: 7 hours.

5. Assessment system

- Two quizzes (during class hours) with theory and problems. This represents 10% of the final mark.

- Final exam, to be done in one of the official calls. It represents 90% of the final mark.
- Completion of the course «Basic Digital Competence: learn to inform yourself, create and communicate digitally (basic level)» and obtain the pass.

The student has the right to base his/her final graded on just a global exam.