27011 - Algebraic Structures

Syllabus Information

Academic year: 2023/24
Subject: 27011 - Algebraic Structures
Faculty / School: 100 - Facultad de Ciencias
Degree: 453 - Degree in Mathematics
ECTS: 6.0
Year: 2
Semester: Second semester
Subject type: Compulsory
Module:

1. General information

The goal of this course is to introduce the students to abstract algebra. This is done starting with the algebraic structures of commutative rings, extending their more concrete knowledge of integers and polynomials.

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

- Be familiar with quotient structures.
- Operate in abelian groups.
- Make groups operate on sets and understand the induced decomposition.
- Operate in commutative rings, with special emphasis on the rings of integeres and of polynomials.
- Construct new rings from known ones and check the properties that are inherited.
- Factorize as a product of irreducible elements.
- Manipulate algebraic expressions with algebraic elements.

3. Syllabus

1. Arithmetic.
    - Integers.
    - Congruences.
2. Sturctures with one binary operation
    - Gruops and monoids
    - actions of groups on sets
3. Rings
    - Basics on rings: homomorphismd, ideals
    - Universal constructioins: direct rproducts, polynomies and rigs of fractions,
    - Factorization on integral domains
    - Factorization on rings of polynomials.

4. Academic activities

Master classes: 45 hours.
Problem solving: 15 hours.
Study: 87 hours.
Assessment tests: 3 hours.

5. Assessment system

- The evaluation will be composed of the following parts:
  - Resolution of questions or problems proposed during the course, in class, in tutorials, in specific lists of problems (a couple of deliveries): grade E.
  - One partial exam: P.
  - A finalm exam: F.
- The calification will be the maximum of (0.15*E+0.35*P+0.5*F), (0.15*E+0.85*F), and (F).

At any rate, the student has the right of being graded on the ground of a single global exam instead of the previous procedure.