COURSE DATA

DATA SUBJECT

Code: 34176
Name: Ring theory
Cycle: Undergraduate Studies
ECTS Credits: 6
Academic year: 2026-27

STUDY (S)

Degree	Center	Acad. year	Period
1107 - Degree in Mathematics	Facultat de Ciències Matemàtiques	4	Second quarter

SUBJECT-MATTER

Degree	Subject-matter	Character
1107 - Degree in Mathematics	Seminar on Algebra	ELECTIVES

COORDINATION

BALLESTER BOLINCHES ADOLFO

SUMMARY

Modules study focuses on the influence thereof in a ring structure. In particular, the non-commutative rings chapter emphasizes the study of simple and semisimple modules with a view to the Representation Theory of Groups modules. The contents of the section of commutative rings are motivated by two of its main fields of application: algebraic geometry and number theory. In this part knowledge of the subjects of Algebraic Equations Algebraic Structures and they complement and basic and specific concepts of commutative rings are studied emphasizing the relationship of these with the corresponding concepts of algebraic geometry and number theory.

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PREVIOUS KNOWLEDGE

RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE

There are no specified enrollment restrictions with other subjects of the curriculum.

OTHER REQUIREMENTS

Linear Algebra I and II, and Algebraic Equations Algebraic Structures.

COMPETENCES / LEARNING OUTCOMES

1107 - Degree in Mathematics

Apply the knowledge in the professional world.

Capacity for analysis and synthesis.

Expressing mathematically in a rigorous and clear manner.

Knowing the time and the historical context in which occurred the great contributions of women and men in the development of mathematics.

Learn autonomously.

Possess and understand the mathematical knowledge.

Solve problems that require the use of mathematical tools.

Visualize and interpret the solutions obtained.

DESCRIPTION OF CONTENTS

1. Preliminary on ring and ideals

Revision of some basic concepts of ideal rings and ring homomorphisms. Prime and maximal ideals. Radicals.

2. Modules

Modules and module homomorphisms. Submodules and quotient modules. Sums and direct products. Free modules. Chain conditions. Finitely generated modules over a PID.

3. Noncommutative rings

Simple and semisimple modules. Maschke theorem.

4. Commutative rings

Neperian and Artinian rings. Integer dependence. Dedekind domains.

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Theory	37,50
Other activities	7,50
Classroom practices	15,00
Total hours	**60,00**

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	0,00
Individual or group project	0,00
Independent study and work	24,50
Preparation of lessons	40,50
Preparation for assessment activities	16,50
Resolution of case studies	8,50
Total hours	**90,00**

TEACHING METHODOLOGY

Attendance is strongly recommended both the lectures and classes of problems. In the lectures we give the necessary and important for understanding and troubleshooting tools. In the classes of problems will deepen the assimilation and understanding of the concepts developed in the lectures by solving problems and exercises. This job are to fruition by the explanations made by the teacher on board and the active participation of students in the discussion of the various arguments used in solving problems. This course will also provide resources through the Virtual Classroom. In the same we will incorporate statements of the lists of issues and additional material that may complement the lectures and problems.

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EVALUATION

The mark obtained in the Xamen count 80% of the final grade. The seminar will note the 10% and 10% participation.

To pass you must obtain a minimum grade of 4 out of 10 on the test.

In the second call, the evaluation system will be the same.

">will be the same.

REFERENCES

- Referencia b1: Atiyah-MacDonald, Introducción al Álgebra Conmutativa. Reverté, 2005
- Referencia c1:Anderson y Fuller, Rings and categories of modules, Springer-Verlag, 1992.
- Referencia b2:Herstein, Noncommutative rings. Reprint of the 1968 original. Carus Mathematical Monographs, 15, 1994
- Referencia b3:Isaacs: Character theory of finite groups, Academic Press, 1976
- Referencia b4:Lam: A first course in noncommutative rings, Springer, 2001
- Referencia b5:Matsumura: Commutative ring theory. Cambridge Univ. Press, 1992
- Referencia c2:Dummit-Foote: Abstract Algebra. Prentince-Hall, 1991.
- Referencia c3:Hungerford: Algebra. Springer-Verlag, 1974
- Referencia c4:Isaacs: Algebra. Brooks/Cole Publications, 1994.
- Referencia c5:Jacobson: Basic Algebra I. Freeman and Co., 1980