VNIVERSITAT (Ď) DVALÈNCIA

COURSE DATA

Data Subject

Code	34175
Name	Group theory
Cycle	Grade
ECTS Credits	6.0
Academic year	2021 - 2022

Study (s)

Degree	Center	Acad. year	Period
1107 - Degree in Mathematics	Faculty of Mathematics	4	First term

Subject-matter

Degree	Subject-matter	Character
1107 - Degree in Mathematics	16 - Seminar on Algebra	Optional

Coordination

Name	Department
MORETO QUINTANA, ALEXANDER	363 - Mathematics

SUMMARY

English

Whether one wants to study groups because of its applications or to do research in the theory, the concept of action is implicit in the nature of the groups, initially as permutation groups but also as transformations or actions on objects and structures of various kinds. The idea of solvability appears at the origin of the theory of groups linked to the solvability by radicals of algebraic equations. Its influence affects the arithmetic structure and its normal structure of groups. Burnside's theorem on the solvability of groups whose order is divisible only by two primes and Hall's theorems are key examples of this.

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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

Knowledge of the course on Algebraic Structures

OUTCOMES

1107 - Degree in Mathematics

- Capacity for analysis and synthesis.
- Solve problems that require the use of mathematical tools.
- Learn autonomously.
- Possess and understand the mathematical knowledge.
- Apply the knowledge in the professional world.
- 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.
- Visualize and interpret the solutions obtained.

LEARNING OUTCOMES

Students should develop those learning skills necessary to undertake further studies with autonomy.

Students should know how to use search tools library resources.

Students should learn how to do presentations and expose their work in public.

Students should be able to be familiar with topics of current interest of recent research in group theory.

DESCRIPTION OF CONTENTS

1. Permutation groups

The general idea will be to develop important concepts on arbitrary abstract groups by means of the study of important families of (finite) groups.

1.- We will study the basic properties of permutation groups, in particular, of the symmetric group and the alternating group. The study of the Sylow subgroups of these groups will help us to introduce the concepts of semidirect product and wreath product.

2. Matrix groups

2.- The student knows that every finite group can be represented as a permutation group. We will see that any group can also be represented as a matrix group. We will introduce a second infinite family of simple groups: the projective special linear groups.

3. Nilpotent groups

3.- We will prove the basic properties of nilpotent groups. We will introduce the Fitting subgroup of an arbitrary finite group.

4. Solvable Groups

4.- We will study solvable groups. In particular, the theorems of Hall. We will notice that despite the fact that they generalize Sylow theorems in the case of solvable groups, this does not hold for arbitrary finite groups.

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	37,50	100
Classroom practices	15,00	100
Other activities	7,50	100
Study and independent work	16,50	0
Readings supplementary material	8,00	0
Preparation of evaluation activities	16,50	0
Preparing lectures	24,80	0
Preparation of practical classes and problem	24,70	0
Resolution of case studies	8,50	0
TOTAL	159,00	

TEACHING METHODOLOGY

English version is not available

EVALUATION

The mark obtained in the exam will count 50 % of the final grade. The seminar will note the 10 % and 40 % participation.

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

In the second call, the assessment system will be the same. **The scores of the seminars and the participation cannot be recovered in the second call.**

REFERENCES

Basic

- Referencia b1: Isaacs, I. M. Finite Group Theory, AMS 2008

- Referencia b2: Kurzweil, H., Stelmacher, B. The Theory of Finite Groups, Springer-Verlag, 2004

- Referencia b3: Rose, J.S., A Course on Group Theory, Cambridge U.P., 1978

Additional

- Rerencia c1: Doerk, K., Hawkes, T.O., Finite Soluble Groups, Walter de Gruyter, 1992.

- Referencia c2: Huppert, B., Endlichen Gruppen I, Springer-Verlag, 1967

- Referencia c3: Gorenstein, D., Finite Groups, Chelsea, 1980

ADDENDUM COVID-19

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This addendum will only be activated if the health situation requires so and with the prior agreement of the Governing Council

In the event of a closure of the facilities due to the health situation, and if this affects all or part of the classes of the subject, these will be replaced by classes where physical attendance will be replaced by online synchronous classes following the established schedules, and with asynchrony work from home.

In the event of a closure of the facilities due to the health situation, and if this affects any of the face-to-face tests of the subject, these will be replaced by tests of a similar nature but in virtual mode through the supported computer tools by the University of Valencia. The evaluation percentages will remain the same as those established in the guide.