COURSE DATA

Data Subject	
Code	34169
Name	Algebraic equations
Cycle	Grade
ECTS Credits	6.0
Academic year	2019 - 2020

Study (s)

Degree	Center	Acad. year	Period
1107 - Degree in Mathematics	Faculty of Mathematics	3	First term

Subject-matter

Degree	Subject-matter	Character
1107 - Degree in Mathematics	11 - Algebraic structures	Obligatory

Coordination

Name	Department
NAVARRO ORTEGA, GABRIEL	5 - Algebra

SUMMARY

The aim of this course is to present the basic concepts and results of Galois theory and its application to the solvability of equations by radicals. This problem, one of the oldest in the history of mathematics, has its origin in Babylonian times, culminating in the work of Galois, who created the theory to characterize solvable equations by radicals. In this course we will begin to introduce this issue in the historical context. After reviewing the basic concepts of the theory of rings, polynomial rings fundamentally and irreducibility criteria, develop the rudiments of the theory of bodies as appropriate formal framework which raise the question of the solvability and clearly present the theory of Galois equations. We'll see how the translation of the problem of group theory shows us how abstract and theoretical branches can solve a problem and more classic applied.

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

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

Other requirements

A good monitoring of the subject happens to have in mind the theory of vector spaces, discussed in the course Linear Algebra and Geometry I, as well as group theory and ring theory given in the subject Algebraic Structures.

OUTCOMES

1107 - Degree in Mathematics

- Capacity for analysis and synthesis.
- Capacity for organization and planning.
- Capacity for criticism.
- Learn autonomously.
- Adapting to new situations.
- Possess and understand the mathematical knowledge.
- Expressing mathematically in a rigorous and clear manner.
- Reason logically and identify errors in the procedures.
- Capacity of abstraction and modeling.
- Knowing the time and the historical context in which occurred the great contributions of women and men in the development of mathematics.

LEARNING OUTCOMES

- To calculate the factoring of polynomials. Build quotient rings especially rings of polynomials and finite fields and operate them.

- Manipulating expressions involving algebraic and transcendental elements, knowing to calculate degrees of the extension.

- To calculate decomposing fields polynomials and calculating the Galois groups of equations of equations of low degree.

- To know how to use the Galois correspondence and to deduce the solvability by radicals of equations of low degree.

DESCRIPTION OF CONTENTS

1. Irreducibility of polynomials.

2. Field extensions. Splitting fields of polynomials

3. Galois extensions. Fundamental theorem of Algebra

4. Solvables groups. Resolubility of equations by radicals.

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	37,50	100
Classroom practices	22,50	100
Other activities	7,50	100
Study and independent work	16,50	0
Preparation of evaluation activities	16,50	0
Preparing lectures	24,80	0
Preparation of practical classes and problem	24,70	0
TOTAL	**150,00**	

TEACHING METHODOLOGY

The course offers 30 hours of classroom theory on two 1-hour sessions per week and 22.5 kinds of problems distributed in two-hour sessions and will at the rate of a maximum of one session per week. There are also 5 sessions of 1.5 hours of seminars to be held during five weeks of the semester. 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 work will be completed 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.

EVALUATION

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

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

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

REFERENCES

Basic

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-Referencia b1: D. S. DUMMIT, R. M. FOOTE, Abstract Algebra. John Wiley & Sons, 2004 (1999, 1991).

-Referencia b2: G. NAVARRO ORTEGA, Un curso de Álgebra. Publicaciones de la Universitat de Valencia, 2002.

-Referencia b3: T. W. HUNGERFORD, Algebra. Springer-Verlag, 1974.
-Referencia b4: N. JACOBSON, Basic Algebra. Vol.1. W.H. Freeman and Company, 1985.

Additional

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-Referencia c1: D. COX, Galois Theory. John Wiley & Sons, 2004.
-Referencia c2: J.B. FRALEIGH, A first course in abstract algebra. Adison-Wesley Publishing Co. 7th edition, 2002.

-Referencia c3: D.J.H. GARLING, A course in Galois Theory. Cambridge Univ. Press, 1986.

-Referencia c4: J. MILNE, Fields and Galois Theory, http://www.jmilne.org/math/

-Referencia c5: F. CHAMIZO, ¡Qué bonita es la teoría de Galois!.Curso en la UAM, 2004. http://www.uam.es/personal_pdi/ciencias/fchamizo/algebraIIn.html

-Referencia c6: A. M. de VIOLA PRIORI, J.E. de VIOLA PRIORI, Teoría de cuerpos y Teoría de Galois. Reverté, 2006.

-Referencia c7: K. SPINDLER, Abstract Algebra with Applications, Vol. I, II, Marcel Dekker, New York, 1994.

ADDENDUM COVID-19

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

English version is not available