

■ CE68 - Galois Theory

GENERAL

SCHOOL	SCIENCES		
DEPARTMENT	MATHEMATICS		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	CE68	SEMESTER	F
COURSE TITLE	GALOIS THEORY		
INDEPENDENT TEACHING ACTIVITIES	WEEKLY TEACHING HOURS	ECTS	
Lectures	4	5	
COURSE TYPE	Scientific Field		
PREREQUISITE COURSES	Algebra I		
LANGUAGE OF TEACHING AND EXAMINATIONS	Greek/English		
THE COURSE IS OFFERED TO ERASMUS STUDENTS	YES		
COURSE WEBSITE (URL)	http://eclass.uowm.gr/		

LEARNING OUTCOMES

Learning Outcomes
With this course, the students will understand the theory of the rings of polynomials and their ideals. They will be able to use irreducible polynomials. They will understand the theory of fields, their extensions and the algebraic approach of geometric constructions. They will understand the Galois group, the Fundamental Theorem of Galois Theory, the solvable groups, the field of roots of polynomials and will study the solving of equations using radicals.
General Competencies

- Search for, analysis and synthesis of data and information, with the use of the necessary technology.
- Working independently for the enhancement of their self-esteem.
- Creation of new research ideas.
- Production of free, creative and inductive thinking, which is based on mathematical processes.

CONTENT OF THE COURSE

Rings, ideals (prime and maximal), Polynomial rings over fields, irreducible polynomials, Lemma of Gauss, criteria of irreducible polynomials.

Fields – Splitting fields, extensions of fields.

Galois group, roots of unity, Solvability by Radicals, Algebraic closed fields, Galois extensions. The Fundamental Theorem of Galois Theory, The Big Galois Theorem.

Applications: Cyclotomic polynomials, solvable groups, solving equations with radicals, regular polygons, Fundamental Theorem of Algebra. Ruler and Compass constructions.

TEACHING AND LEARNING METHODS - EVALUATION

TEACHING METHOD	In the classroom.	
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY	Use of e-class,. Communication through face-to-face discussions and e-mails.	
TEACHING ORGANIZATION	Activity	Semester Workload
	Lectures	52 hours
	Individual Study	73 hours
	Course Total (25 hours per ECTS)	125 hours
STUDENT EVALUATION	Optional projects during the whole semester, with presentations. (bonus to the final grading) Written final examination 100%.	

RECOMMENDED BIBLIOGRAPHY

1. D. Dummit, R. Foote, Abstract Algebra, 3rd edition, Wiley publications, 2004. (english)
2. J.Fraleigh, Introduction to Algebra, University Publications Crete, 2012 (Greek).
3. N.Marmaridis, Basic Galois Theory, Publications Kallipos, 2021 (Greek).
4. J.Rotman, Galois Theory, Publications Leader Books, 2000 (Greek).
5. Th. Theochari-Apostolidou and C. M. A. Charalambous, Galois Theory, Publications Kallipos, (2015). (Greek)