



Course Information

Course Code	2360368
Course Section	1
Course Title	FIELD EXTENSIONS AND GALOIS THEORY
Course Credit	3
Course ECTS	6.0
Course Catalog Description	Field extensions, splitting field of a polynomial, multiple roots, Galois group, criteria for solvability by radicals, Galois group as permutation groups of the roots of polynomials of degree n , constructible n -gons, transcendence of e , finite fields.
Prerequisites	Students must complete one of the following sets to take this course.

Set	Prerequisites
-----	---------------

1	2360367
---	---------

Schedule

Wednesday, 12:40 - 13:30, M102
Friday, 12:40 - 13:30, M104

Instructor Information

Name/Title	Assoc.Prof.Dr. TOLGA KARAYAYLA
Office Address	M-222
Email	tkarayay@metu.edu.tr
Office Phone	210 5362
Office Hours	To be announced

Course Objectives

The course focuses on fundamentals of field theory, field extensions and Galois theory. In particular, various types of field extensions such as finite, algebraic, transcendental, separable and normal extensions are discussed. A second theme is a brief introduction to Galois theory along with a proof of the fundamental theorem about Galois correspondence. Various applications of Galois theory such as compass-straightedge constructions and solvability by radicals is discussed.

Course Learning Outcomes

At the end of the course a successful student will

- Identify different types of field extensions and state their main properties,
- Find minimal polynomials, test a given polynomial for irreducibility,
- Compute the set of embeddings of a given field into another,
- Carry out certain impossibility proofs, especially using degree of a field extension,
- Find the splitting field of a set of polynomials,
- Determine if a given element or extension is separable,
- Identify algebraically independent elements and compute transcendence degree,
- Find the lattice of intermediate fields between two fields,
- Compute the Galois group of a field extension,
- Match the lattice of intermediate fields between two fields and subgroups of the Galois group through the Galois correspondence maps.

Instructional Methods

The course is based on in class lectures and discussions, solving exercise problems and independent reading.

Course Textbook(s)



"Galois Theory" by David Cox, 2nd Edition, Wiley&Sons.

E-book available at METU Library.

Course Material(s) and Reading(s)

Material(s)

None

Reading(s)

Roman, S. "Field Theory",

Stewart, I. "Galois Theory",

Dummitt, D. S. , Foote, R. M. "Abstract Algebra"

Supplementary Readings / Resources / E-Resources

Readings

None

Assessment of Student Learning

Assessment	Dates or deadlines
Midterms: There will be two midterm exams. Some of the midterm questions will be selected from a list of suggested exercise problems from the textbook or other sources.	Midterm 1: Week 7, Midterm 2: Week 11.
Final: Final exam will cover all subjects. Some questions will be selected from the preassigned suggested exercise problems. There will be a bonus question in each midterm and the final.	To be announced.
Bonus for Attendance: 6 points bonus for attending at least 90% of the lectures and 3 points bonus for attending 75% - 90% of the lectures. There is no NA criterion related to attendance.	

Course Grading

Deliverable	Grade Points
Midterm 1	30
Midterm 2	30
Final	40
Bonus (for attending at least 90% of the lectures) (3 points bonus for attending 75% - 90% of the lectures)	6
Total	106

Course Policies

Class Attendance

There will be 6 or 3 points bonus for attending the lectures. There is no NA grade criterion related to attendance.



Make up for Exams and Assignments

In order to be eligible to enter a make-up examination for a missed examination, a student should have a documented or verifiable, and officially acceptable excuse. A student cannot get make-up examinations for two missed exams. The make-up examination for all exams will be after the final exam, and will include all topics.

Information for Students with Disabilities

To obtain disability related academic adjustments and/or auxiliary aids, students with disabilities must contact the course instructor and the ODTÜ Disability Support Office as soon as possible. If you need any accommodation for this course because of your disabling condition, please contact me. For detailed information, please visit the website of Disability Support Office: <http://engelsiz.metu.edu.tr/>

Academic Honesty

The METU Honour Code is as follows: *"Every member of METU community adopts the following honour code as one of the core principles of academic life and strives to develop an academic environment where continuous adherence to this code is promoted. The members of the METU community are reliable, responsible and honourable people who embrace only the success and recognition they deserve, and act with integrity in their use, evaluation and presentation of facts, data and documents."*