

# Math 368

Field Extensions and Galois Theory  
Ömer Küçüksakallı - Spring 2011, METU

## Course Webpage:

<http://www.metu.edu.tr/~komer/368/>

## Textbook:

Ian Stewart, Galois Theory (Chapman & Hill, 3rd edition)

## Reference:

James Milne, Fields and Galois Theory (Available Online)

## Grading:

- Midterm 1 : 30%
- Midterm 2 : 30%
- Final : 40%

## Tentative Course Outline:

1. **Preliminaries:** Classical algebra, factorization of polynomials, fundamental theorem of algebra, irreducibility, Gauss's Lemma, Eisenstein's criterion.
2. **Field extensions:** Simple extensions, algebraic and transcendental case, minimal polynomial, classification of simple extensions.
3. **Algebraic numbers:** Degree of an extension, tower law, algebraic elements and algebraic extensions, geometric constructions with a ruler and a compass.
4. **Galois group:** The Galois group of an extension, the Galois correspondence between subgroups and intermediate fields.
5. **Normal extensions:** Splitting field for a polynomial, normal extensions, normality of intermediate extension, normal closure.
6. **Solving polynomials:** The Galois group of a polynomial, solution by radicals and radical extensions, example of an insoluble quintic.
7. **Cyclotomic extensions:** Cyclotomic fields, regular polygons, the first case of Fermat's Last Theorem.