# Department of Mathematics Faculty of Science

**MATH 722 (206722) FIELD THEORY 3(3-0-6)  
Prerequisite** Consent of the instructor

**Course Descriptions :**

Concept of rings and fields, homomorphisms, vector spaces, and polynomials. Extensions of fields and factorization of polynomials. Galois theory, automorphism of fields, norms and traces, and normal classes. Applications to : finite fields, cyclotomic extensions, cyclic extensions. Wedder Burn’s theorem, ruler and compass construction and generic polynomials.

**Course Contents No. of Lecture Hours**

1. Groups, rings, integral domains, fields 9

- Groups

- Rings, integral domains and fields

- Polynomial rings

- Vector

2. Some elementary field theory 9

- Extensions

- Algebraic extensions

- Spliting fields

- Algebraic closure

- Finite fields

3. The structure of algebraic 12

- The structure of an irreducible polynomial

- Seperable and inseperable extensions

- Normal and Galois extension

4. Galois theory 15

- The Galois correspondence theorem

- The normal basis theorem

- Norm and trace

- Cyclotomic extensions

- Cyclic extensions

- Abelian extensions

- Solvable extensions

- Theory of equations

Total 45