

# MATH 522 - Algebra II

## SPRING 2026

**Instructor:** Ayhan Günaydin

**Schedule:** Monday-Wednesday 09:00–10:50

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This course has two (related) parts. The first half of the course will be devoted to the study of fields and Galois Theory. Then we shall concentrate on extensions of commutative rings. Below are the topics we shall cover:

- Field Extensions
- Normal and Separable Extensions
- Fundamental Theorem of Galois Theory
- Cyclotomic Extensions
- Norm and Trace
- Hilbert's 90 and Abelian Kummer Theory
- Noetherian Rings
- Integral Extensions
- Localization
- Discrete Valuation Rings and Dedekind Domains

## Sources

We will provide some lecture notes that contain every topic we cover. However, the following books might be very useful to follow the course; the proofs in the lecture notes are mostly from the first two.

- S. Lang; *Algebra*, Second Edition, Addison-Wesley, 1984. (Or: Revised Third Edition, GTM 211, Springer-Verlag, 2002.)
- T.W. Hungerford; *Algebra*, Eighth Edition, Springer GTM, 1980.
- D.S. Dummit, R.M. Foote; *Abstract Algebra*, Third Edition, John Wiley and Sons, 2004.
- M.F. Atiyah, I.G. Macdonald; *Introduction to Commutative Algebra*, Addison-Wesley, 1969.
- E. Artin; *Galois Theory*, Dover, 1997 (Originally published in 1942)

## Office Hours

By appointment.

## **Grading Policy**

The final grade is determined by three components: Homeworks (30%), Midterm Exam (30%), and Final Exam (40%).

The homework assignments will be done on a weekly basis. The date of the exams are to be determined later.