

MATH 504

Advanced Algebra

(2022 Fall Semester)

by
Ayberk Zeytin

Prerequisites: I strongly advise you to keep your undergraduate notes on abstract algebra nearby.

Credits: (3-0)3 / 7 ECTS

Outline: This will be a standard graduate algebra course. It will have two parts

- ▶ Group Theory
- ▶ Ring Theory

The first part is expected to take about 7 weeks and the second will last for the remaining 7 weeks. We will review standard concepts (rather fast) to make time for the new ones. You will (hopefully) have 7 exercise sheets - one sheet every two weeks is the plan. These exercise sheets are aimed at providing you with a working knowledge and can be viewed as a preparation for the exams. Below is a tentative outline:

- 2 weeks Groups, subgroups, normal subgroups and many examples
 - 1 week quotient groups, isomorphism theorems,
 - 1 week direct products, free groups,
- 2 weeks group actions and Sylow theorems
 - 1 week nilpotent and solvable groups
- 1 week Rings, ring homomorphisms, examples (polynomial rings and formal power series rings)
- 1 week ideals and rings of quotients, isomorphism theorems
- 1 week factorization in commutative rings, principal ideal domains, Euclidean domains, unique factorization domains,
- 1 week Modules, homomorphisms,
- 3 weeks exact sequences, free modules, modules over a PID

Course web page: <http://math.gsu.edu.tr/azeytin/this-semester.html>

Bibliography:

- Dummit & Foote , *Abstract Algebra*
- Grove, L. C., *Algebra*
- Hungerford, T. W., *Algebra*
- Jacobson, N., *Basic Algebra*
- Lang, S., *Algebra*

Programme: Friday 10h00 - 13h00 @ TBA

Evaluation:

- Quizzes: % 60
- Final: % 40