

# Math 7261 Algebraic Theory I

Fall 2017

Instructor: Paul Balister

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Class: MWF 11:30am-12:25pm, Dunn Hall 231

Office Hours: MWF 11:00am-11:25am, Dunn Hall 331, or by appointment

Textbook: *Abstract Algebra, Theory and Applications*, by Thomas Judson

<http://abstract.ups.edu/download/aata-20140815.pdf>

Notes will also be provided by the instructor:

[Sets, Numbers, Proofs.](#)

[Groups.](#)

[Rings.](#)

Description: This is a graduate course in Abstract Algebra which splits into 3 parts.

1. The first part of the course covers some basics of sets, numbers, and proof techniques.
2. The second part of the course covers group theory, including subgroups, cosets, quotient groups, homomorphisms, isomorphism theorems, permutation groups, products, classification of finite abelian groups, free groups and group presentations, group actions, Sylow theory, Jordan-Hölder, solvable groups.
3. The third part of the course covers ring theory, including ideals, quotients, isomorphism theorems, the Chinese remainder theorem, primes and localizations, polynomial rings, factorization theory.

Prerequisites: Math 6261 or permission of instructor.

Goals: In addition to learning about groups, rings, etc., key goals include being able to communicate effectively about abstract mathematical concepts, construct and recognize rigorous proofs, and to pass the PhD algebra qualifying exam.

Grades: A-F with +/- grades will be used. Grades will be based on:

1. Weekly homework assignments (40%)
2. Class participation (10%)
3. Two (mid-term and late-term) take-home exams (20%)
4. A final, comprehensive, in-class exam (30%)

Homework will usually be set on Mondays and will be due the following Monday.

Class participation will involve active discussion of problems in class, and presenting solutions at the board.

The format of the take-home exams and the final will be modeled on the PhD qualifying exam, so as to provide students with practice for that exam.

Collaboration: Students are allowed, and even encouraged, to discuss homework and other problems with other students. However, the write up of the homework must be the work of the student alone (i.e., no word-for-word copying). Also, if you know how to do a problem, please don't just immediately tell other students the complete solution! Give hints and advice on how to approach the problem instead.

Final exam: **Monday, December 11, at 10:30am.**