

## MATH 470, Fall 2021

### Graduate Algebra

**Instructor:** Paul Goerss  
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**Office hours:** Monday and Wednesday at 3PM, or by appointment. Zoom appointments are possible. COVID willing I'm in most afternoons. If you can find me, you can talk to me.

**Course Time:** MWF Lunt Hall 104 at 12Noon

**Text:** Aluffi, *Algebra: Chapter 0*

This is part of a three-quarter course, with the first quarter covering the basics of graduate algebra. The textbook is intended as a reference; another standard source is Lang's *Algebra*. The topics for the first quarter include but are not limited to:

1. Groups, subgroups, and homomorphisms
2. Examples: automorphism groups, symmetry groups, linear groups, etc.
3. Group actions, counting formulas, Cauchy's Theorem
4. The structure of finite groups, including the Sylow and Jordan-Hölder theorems
5. Rings, ring homomorphisms, ideals, and modules
6. Examples: automorphism rings, group rings and their modules
7. Principle Ideal Domains, Unique Factorization Domains
8. Commutative rings, prime and maximal ideals; Noetherian Rings
9. Hilbert Basis Theorem
10. Basic homological algebra: derived functors and the snake lemma.

**The Evaluation Component – Grades:** The course work will consist entirely of written work to be done outside of class, due approximately every other week. This will be a mixture of standard problems drawn from the text and longer, themed assignments which will be called *Projects*. One such will be due during exam week, **All work is meant to be done collaboratively; the only rule is that you must hand in your own work.**

**Where to find the course material:** This syllabus, all assignments, and a statement of University policies and procedures can be found on Canvas. The last includes those policies that arise directly from the COVID-19 Pandemic.