Math 5591H **Algebra II** Spring 2024

MTWRF 11:30-12:25, JB (Journalism Building) 353

Instructor: Alexander (= Sasha) Leibman
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Textbook: D.S.Dummit and R.M.Foote, *Abstract Algebra*, 3rd edition. We will cover Chapters 10–12 (modules) and 13–14 (algebraic extensions of fields and the Galois theory). I will mainly follow the book, but sometimes change the order in which the material is presented, skip or add some topics. (Nevertheless, just reading and understanding the book would be suffice to pass the course.)

Topics: Ch. 10: Definition and constructions of modules; homomorphisms of modules and isomorphism theorems; commutative diagrams and exact sequences; direct sums and products of modules; universal objects; free modules; tensor products; tensor algebras; flat, projective, and injective modules.
Ch. 11-12: "Linear algebra" – homomorphisms of free modules of finite rank, dual modules, matrices; homomorphisms as tensor products; modules over PIDs; rational and Jordan normal forms of matrices.
Ch. 13-14: Algebraic field extensions; splitting fields and algebraic closures; separable extensions; cyclotomic extensions; finite fields; embeddings of extensions; normal extensions; Galois extensions; Galois group, Galois theorem; applications of the Galois theory; solvable extensions and solvability of polynomials in radicals.

Lectures and recitations: I won't follow the offical schedule, there will be no recitations on Tuesdays and Thursdays. Instead, I plan to devote Fridays to discussing problems from the textbook.

Carmen and the course webpage: I'll support a webpage at

https://people.math.osu.edu/leibman.1/algebra2/

to which the OSU Carmen will be linked.

Homework: Every week I'll give you 5–7 exercises as a homework. You may turn in your solutions in person, by mail, or by Carmen; Carmen is preferable. (Solutions to many problems from the book can be found on the internet, and it is ok to use them; it would, however, be more useful to solve these problems by yourself.)

Exams: There will be two exams: a midterm devoted to modules, and a final devoted to the Galois theory.

Final grade: It will be calculated using the formula 40% homework+30% midterm+30% final.