

# 18.703 Modern Algebra

Spring 2019 Tu-Th 2:30–4:00 Room 2–135

V. Kac

Office Hours: by appointment, 2–176

## Syllabus

- Lecture 1 (February 5): Binary operations, groups, group tables
- Lectures 2, 3 (February 7, 12): Cyclic groups, applications to number theory
- Lectures 4, 5 (February 14, 21): Groups of permutations, braid groups, dihedral groups
- Lecture 6 (February 26): Lagrange's theorem and its applications
- Lecture 7 (February 28): Homomorphisms and isomorphisms
- Lecture 8 (March 5): Normal subgroups and conjugacy classes, factor groups
- Lecture 9 (March 7): Classification of finitely generated abelian groups
- Lecture 10 (March 12): Group action, Burnside formula and applications to combinatorics
- Lectures 11, 12 (March 14, 19): Sylow theorems and applications
- Lecture 13 (March 21): Test 1
- Lecture 14 (April 2): Rings and fields
- Lectures 15, 16 (April 4, 9): Integral domains and applications
- Lecture 17 (April 11): Fundamental homomorphism theorem, ideals, factor rings. Quaternions
- Lecture 18 (April 16): Rings of polynomials, Eisenstein criterion
- Lectures 19, 20 (April 18, 25): Principal ideal domains and applications
- Lecture 22 (April 30): Unique factorization domains and Gauss lemma
- Lecture 21 (May 2): Euclidean domains
- Lecture 23 (May 7): Field extensions, applications to planar geometry
- Lecture 24 (May 9): Test 2
- Lectures 25, 26 (May 14, 16): Discussion

**Textbook:** *A First Course in Abstract Algebra*, J.B. Fraleigh, 7th edition, 2003 Pearson Education, Inc.

**Grader:** TBA

The grade for the course will be based on home assignments (50%) and on two tests (50%). No final.