



Time: Mo, We 3:00PM - 4:15PM (I+ block) and Mo, We 4:30PM - 5:45PM (K+ block)
Bromfield-Pearson Room 007
Instructor: Dr. Robert Kroholler
Office: SEC 010
Office Hours: Mon, Wed 11 – 12
E-mail: robert.kroholler@tufts.edu

Text: *Lecture notes at <http://robertkroholler.com/algebrafall2018/notes.pdf>* by Robert Kroholler.

Additional Text: *Abstract Algebra* by Beachy and Blair

Content: Algebra is the study of patterns and structures. For this reason it is the underpinning of many areas of mathematics. This course will concentrate on the basic theory of Groups and Rings. We will cover the following topics.

1. Syllabus, Sets and functions
2. Equivalence relations
3. Modular arithmetic
4. Binary Operations and Group Axioms
5. Cayley Tables and Cyclic Groups
6. Dihedral Groups
7. Symmetric groups and permutations, cycle notation
8. Cycle type and transpositions
9. Even and odd permutations, the alternating group
10. Subgroups generated by a set
11. Orders of elements, Lagrange's theorem and consequences
12. Homomorphisms, isomorphisms, kernels and images
13. Normal subgroups and quotients
14. Isomorphism theorems
15. Finitely generated abelian groups
16. Group Actions and Cayley's theorem
17. Sylow theory and building groups from old
18. Simplicity of the alternating group
19. Ring theory
20. Polynomial Rings
21. Ideals and Homomorphisms
22. Isomorphism theorems and chinese remainder theorem

Learning Objectives: This course addresses Learning Objectives 1c, 1d, 2b, 6 for <http://ase.tufts.edu/faculty/committees/objectives/math.htm> in Mathematics.

Homework: There will be weekly homework assigned throughout the course of the semester. You may work on it in groups but should submit your own copy in your own words and writing.

Exams: There will be a midterm and a final exam. The midterm date will be agreed upon in class. The final will be on the 13th December at 3:30 for the I+ block and 13th December at 7:00 for the K+ block.

Grades: Your course grade will be calculated using the following formula:

$$30\% \text{ HW} + 30\% \text{ Midterm} + 40\% \text{ Final.}$$

Student Accessibility Services If you are requesting an accommodation due to a documented disability, you must register with the Student Accessibility Services Office at the beginning of the

semester. To do so, call the Student Accessibility Services office at 617-627- 4539 to arrange an appointment with Kirsten Behling, Program Director of Student Accessibility Services.