

Math 322: September 2018

Time: TuTh 1400:1530

Place: LSK 460

Instructor: Vinayak Vatsal (Math 322c)

Instructor email: lastname at math-ubc-ca (use dots instead of dashes)

Pre-requisites: Either (a) a score of 68% or higher in one of [MATH 223](#), [MATH 310](#) or (b) one of [MATH 152](#), [MATH 221](#), [MATH 223](#) and a score of 80% or higher in [MATH 220](#)

Recommendation: It is strongly recommended that you take Math 312 in conjunction with this course. The material is closely connected, and your understanding of both classes will be improved.

Textbook: We will primarily follow the book Basic Algebra I, by Nathan Jacobson. Other references include Dummit and Foote, Abstract Algebra; Rotman, An Introduction to the Theory of Groups (this book is available at no cost, online from Springerlink, accessible through the UBC Library); Herstein, Topics in Algebra.

Homework: There will be weekly homework sets, due on Tuesdays in class, and weekly readings, and regular **in-class clicker questions**. I recommend that you keep up with the readings, and read in advance of class.

Piazza: There is a course Piazza page on Canvas. I will check in periodically and answer questions, to the extent that it is possible electronically. But owing to the complicated nature of the material, it might be easier to come to office hours or to make an appointment if the set times are inconvenient.

Exams: One midterm, in class on October 18, and a final exam set by the University.

Assessment: 10% Clicker, 20% homework, 30% midterm, 40% final.

Syllabus and course schedule

Week 1 September 6: Equivalence relations and the integers (Read Jacobson 0.1-0.6)

Week 2 September 11, 13: Monoids and groups of transformations, abstract monoids and groups, Cayley's theorem (Jacobson 1.1-1.3). Homework 1 due.

Week 3 September 18, 20: Associativity, commutativity, submonoids and subgroups (Jacobson 1.4, 1.5)

Week 4 September 25, 27: Cycle decomposition of permutations, orbits, cosets (Jacobson 1.6, 1.7)

Week 5 October 2, 4: Congruences, quotients (Jacobson 1.8, 1.9)

Week 6 October 9, 11: Subgroups of a homomorphic image, isomorphism theorems, free objects)

Math 322: September 2018

Week 7 October 16, 18: Midterm, groups acting on sets (Jacobson 1.12)

Week 8 October 23, 25: Groups acting on sets, Sylow theorems (Jacobson 1.12, 1.13)

Week 9 Oct 30, Nov 1: Sylow theorems, Finite abelian groups, finitely generated abelian groups (Jacobson 1.12, Rotman Chapter 6)

Week 10 Nov 6, 8: Finite abelian groups, finitely generated abelian groups (Rotman Chapter 6)

Week 11 Nov 13, 15: simplicity of alternating groups (Jacobson 4.6)

Week 12 Nov 20, 22: Additional topics to be decided

Week 13 Nov 27, 29: Additional topics to be decided