

PMATH 347 Groups and Rings, Course Outline, Spring 2024

Lectures: MWF 12:30-1:20 in MC 1056

Instructor: Stephen New, email snew@uwaterloo.ca, office hours MW 1:30-3:00, MC 5419.

Website: Course materials can be found at <https://www.math.uwaterloo.ca/~snew/>

Text: There is no required text. Lecture notes will be provided, along with some exercises for each chapter. You must read and understand all of the lecture notes. You should also work on the exercises: solve as many as you can, and read and understand all of the solutions. A suggested book is Abstract Algebra, 3rd Edition, by D. Dummit and R. Foote.

Course Outline: We will cover all of the material from Chapters 1 to 10, and some from Chapters 11 and 12 from the posted lecture notes.

Chapter 1: Definition and Examples of Groups and Rings

Chapter 2: Subgroups, Cyclic Groups and Generators

Chapter 3: The Symmetric and Alternating Groups

Chapter 4: Group Homomorphisms and Isomorphisms

Chapter 5: Cosets, Normal Subgroups and Quotient Groups

Chapter 6: The Classification of Finite Abelian Groups

Chapter 7: Group Actions and the Sylow Theorems

Chapter 8: The Classification of Groups of Small Order

Chapter 9: Definitions and Examples of Rings and Subrings

Chapter 10: Ring Homomorphisms, Ideals and Subrings

Chapter 11: Factorization in Commutative Rings

Chapter 12: Polynomial Rings

Assignments: There will be about six assignments, to be submitted using Crowdmark. Students may receive help from any source as long as the help is acknowledged. Your solutions must be written in your own words (not copied) and they must reflect your own understanding. Each student's lowest assignment mark will be dropped.

Tests: There will be a midterm test on Monday June 24th in EXP 1689 from 4:30-6:20 pm, and there will be a final exam, to be scheduled later. The exam will cover all of the course material. Calculators will not be allowed on tests.

Course Mark: The final course grade G will be given by the maximum of the two marking schemes

$$G = 20\%A + 30\%T + 50\%E$$

$$G = 10\%A + 15\%T + 75\%E$$

where A is the average of the assignment marks (with the lowest mark dropped), T is the mark on the term test, and E is the mark on the final exam.

Persons with Disabilities: Access Ability Services located in Needles Hall, Room 1132, collaborates with all academic departments to arrange appropriate accommodations for students with disabilities without compromising the academic integrity of the curriculum. If you require academic accommodations to lessen the impact of your disability, please register with the Access Ability Services at the beginning of each academic term.

Academic Integrity: In order to maintain a culture of academic integrity, members of the University of Waterloo community are expected to promote honesty, trust, fairness, respect and responsibility. (Check www.uwaterloo.ca/academicintegrity/ for more information.)

Grievance: A student who believes that a decision affecting some aspect of his/her university life has been unfair or unreasonable may have grounds for initiating a grievance. Read Policy 70, Student Petitions and Grievances, Section 4, <http://www.adm.uwaterloo.ca/infosec/Policies/policy70.htm>. When in doubt please be certain to contact the department's administrative assistant who will provide further assistance.

Discipline: A student is expected to know what constitutes academic integrity to avoid committing academic offenses and to take responsibility for his/her actions. A student who is unsure whether an action constitutes an offense, or who needs help in learning how to avoid offenses (e.g., plagiarism, cheating) or about "rules" for group work/collaboration should seek guidance from the course professor, academic advisor, or the undergraduate associate dean. For information on categories of offenses and types of penalties, students should refer to Policy 71, Student Discipline, <http://www.adm.uwaterloo.ca/infosec/Policies/policy71.htm>. For typical penalties check Guidelines for the Assessment of Penalties, <http://www.adm.uwaterloo.ca/infosec/guidelines/penaltyguidelines.htm>.

Appeals: A decision made or penalty imposed under Policy 70, Student Petitions and Grievances (other than a petition) or Policy 71, Student Discipline may be appealed if there is a ground. A student who believes he/she has a ground for an appeal should refer to Policy 72, Student Appeals, <http://www.adm.uwaterloo.ca/infosec/Policies/policy72.htm>.