Instructor Information	**Name:** Jason LeGrow **Office:** McBryde 470 **Email:** `jlegrow@vt.edu`
Class Times	Monday, Wednesday, Friday 9:05 – 9:55am
Class Location	McBryde 210
Office Hours	Tuesday 2:15 – 4:15pm, and other times by appointment.
Course Website	`https://canvas.vt.edu`
Prerequisites	Math 3124 This course may require the use of a computer algebra system of your choice. I recommend Maple.
Textbook	The main textbook for the course is: Dummit, D. S., & Foote, R. M. (2004). **Abstract Algebra.** John Wiley & Sons. Some material on Pólya enumeration will come from: Aigner, M. (2010). **A Course in Enumeration.** Springer.
Course Objectives	This is a second course in algebra. We will study more advanced group theory, including topics chosen from among: group actions and their application to combinatorial enumeration, group automorphisms, Sylow theorems, direct and semidirect products, the Fundamental Theorem of Finite Abelian Groups, p-groups, nilpotent and solvable groups, group presentations, the representation theory of finite groups, and groups in cryptography.
Course Outline	I intend to cover the following topics: **Introduction to Group Actions.** Introduction and basic definitions; permutation representations; groups acting on themselves by left multiplication and by conjugation; the class equation and its consequences. **Pólya Enumeration.** Review of the fundamentals of enumerative combinatorics; patterns and symmetries; Burnside's Lemma; Pólya's Theorem. **Structure of Finite Groups.** Sylow Theorems; direct products; the Fundamental Theorem of Finite Abelian Groups; semidirect products; p-groups, nilpotent groups, and solvable groups. **Additional Topics (time permitting).** Group presentations and the word problem. Introduction to the representation theory of finite groups. Groups in cryptography.
Grading	Assignments will be worth 30% of your grade, two midsemester tests will be worth 40% of your grade (20% each), and the final exam will be worth 30% of your grade. **Assignments.** There will be a number of assignments, each due on a **Tuesday at 11:59pm**. Your lowest assignment grade will be dropped. Late assignments will not be accepted. **Tests and Exams.** The tests are tentatively scheduled for 1. **Monday, September 25, in class** 2. **Monday, October 30, in class** The final exam is scheduled by the registrar's office; check the course schedule.

No books, notes, cell phones, or collaboration are allowed on tests or exams. No make-up exams will be given without written authorization from the Dean of Students Office (`dos.vt.edu`). Incomplete grades are only assigned in very rare cases (such as documented severe illness during final exams).

Collaboration

You are welcome—in fact, *encouraged*—to collaborate with current Math 4124 students while solving assignment problems. However, you must write your solutions separately, and the solution you submit must be your own. If you do collaborate, you must write the name of all of your collaborators on the first page of your assignment. If you use external resources (*e.g.* textbooks) you must cite them precisely. You must **not** post assessment problems or solutions on any platform (*e.g.,* CourseHero, Chegg).

Attendance

Attendance is not required, but it is *highly* encouraged. While lectures will mostly be based on the textbook or similar resources, I will provide additional explanation and context that will help you to understand the material.

Academic Integrity

The Undergraduate Honor Code pledge that each member of the university community agrees to abide by states:

"As a Hokie, I will conduct myself with honor and integrity at all times. I will not lie, cheat, or steal, nor will I accept the actions of those who do."

Students enrolled in this course are responsible for abiding by the Honor Code. A student who has doubts about how the Honor Code applies to any assignment is responsible for obtaining specific guidance from the course instructor before submitting the assignment for evaluation. Ignorance of the rules does not exclude any member of the University community from the requirements and expectations of the Honor Code.

The Virginia Tech honor code pledge for assignments is as follows:

"I have neither given nor received unauthorized assistance on this assignment."

The pledge is to be written out on all graded assignments at the university and signed by the student. The honor pledge represents both an expression of the students support of the honor code and a commitment to uphold the academic standards at Virginia Tech.

Academic Accommodations

Virginia Tech welcomes students with disabilities into the Universitys educational programs. The University promotes efforts to provide equal access and a culture of inclusion without altering the essential elements of coursework. If you anticipate or experience academic barriers that may be due to disability, including but not limited to ADHD, chronic or temporary medical conditions, deaf or hard of hearing, learning disability, mental health, or vision impairment, please contact the Services for Students with Disabilities (SSD) office (540-231-3788, `ssd@vt.edu`, or visit `ssd.vt.edu`). If you have an SSD accommodation letter, please meet with me privately during office hours or by appointment as early in the semester as possible to deliver your letter and discuss your accommodations. You must give me reasonable notice to implement your accommodations, which is generally 5 business days and 10 business days for final exams.

Policy Changes

This course policy sheet is subject to change pending changes in the university policy. If the university policy changes (*e.g.*, we go all online), a new course policy sheet will be posted to Canvas, and it is your responsibility as a student to inform yourself of the changes made.