MthS 4120/6120: Modern Algebra
Fall 2013
Long Hall, Room 123,   TTh 2:00–3:15

Instructor	Dr. Matt Macauley (`macaule@clemson.edu`)
	OFFICE: Martin Hall O–325
	PHONE: (864) 656–1838 (no voicemail!)
	OFFICE HOURS: (subject to change!) TTh 10:30–11:30, or by appointment
	WEBSITE: `http://www.math.clemson.edu/~macaule/classes/f13_mthsc412/`
Tutor	Lee (Andy) Jenkins (`leej@clemson.edu`)
	HOURS: Sun. 4–7pm, Mon. 5:30–7:30pm, Wed. 5:30–7:30pm.
	LOCATION: Cooper Library, 5th floor.
Textbook	*Visual Group Theory*, by Nathan Carter.
Prerequisites	MthS 3110 (Linear Algebra). A proof-based course (e.g., MthS 1190 or 3190), or at least some experience writing proofs, is recommended.

Overview
: Group theory is the study of symmetry, and is one of the most beautiful areas in all of mathematics. It arises in puzzles, visual arts, music, nature, the physical and life sciences, computer science, cryptography, and of course, all throughout mathematics. This course will cover the basic concepts of group theory, with a a special effort will be made to emphasize the intuition behind the concepts and motivate the subject matter.

  Many pictures and diagrams will be provided. In class, we will play with the Rubik's cube. We will draw with colored pencils, use scissors to cut shapes from colored paper, and use free mathematical software such as *Sage* and *Group Explorer*. We will analyze art freises, chemical molecules, and contra dances. At the end of the semester, you will truly understand groups, subgroups, cosets, product and quotients, homomorphisms, group actions, conjugacy classes, centralizers, normalizers, semidirect products, theorems by Lagrange, Cayley, Cauchy, and Sylow, and what Évariste Galois stayed up until dawn writing the night before his untimely death in a duel at age 20, that remains one of the most celebrated achievements in all of mathematics.

  In the end, you will leave with a new appreciation of the beauty, and difficulty, of an area of mathematics you never dreamt existed.

Learning Outcomes
: By the end of the semester, students will be able to:
- Demonstrate a solid understanding of group theory at the undergradate level.
- Explain to a friend or family member who knows nothing about mathematics what group theory is, how it arises, and why it's beautiful.
- Explain how group theory can be thought of as the study of symmetry, and how it arises in puzzles, visual arts, the sciences, and other brances of mathematics.
- Use visual diagrams and pictures to demonstrate the important definitions and concepts of group theory (of course, in addition to being able to define them rigorously).
- Learn to understand, read, and write rigorous mathematical proofs on group theory.

- Develop good mathematical writing skills. Important aspects of this are *accuracy*, *clarity*, and *conciseness*.

Policies
- Homework assignments will accumulate from lecture to lecture and will be due roughly once a week. I will post the problems on my website. Late homework will *not* be accepted.
- Attendance is mandatory. Please bring your copy of *Visual Group Theory* to class, as I will refer to it throughout lecture.
- If you get an A or B on the final exam, then you get at least that grade in the course, provided you have (i) attended class *very* regularly, and (ii) maintain a passing grade on the homework.
- All drop/add procedures are your responsibility.
- Absent Professor Policy: If the instructor has not arrived within 15 minutes of the scheduled class time, you may assume that class has been canceled.
- All use of cell phones, laptops, and PDAs is prohibited during lecture. Calculators, cell phones, laptops, and PDAs will not allowed during exams.
- Cell phone policy: `http://www.youtube.com/watch?v=FYwpxU_G4Z0`
- I will NOT post homework solutions. However, I will gladly help you with any of the problems during office hours or whenever I'm around.
- No whining.

Grading

The final grade will be calculated as follows:

HOMEWORK:	20%
QUIZZES & IN-CLASS WORK:	15%
PARTICIPATION:	5%
MIDTERM 1:	20%
MIDTERM 2:	20%
FINAL EXAM:	40%

I will drop either your lowest midterm, or half the weight of your final exam.

Homework

Homework assignments will accumulate from lecture to lecture and will be due several times a week. I will post the assignments on my website, as I like to make all materials freely available to everybody (Warning: Websites such as *Course Hero* are a SCAM!). Students may collaborate on their homework problems, but they *must* write up and submit their homeworks separately as well as document their collaborators. Late homeworks will **not** be accepted. You are encouraged to typeset your homework assignments (LaTeXpreferred but not required), and you will get an extra night to complete it if you do (okay to hand-draw pictures, though – there will be many!). You should keep all the graded homeworks in case of missing grades due to missing name or typo errors.

Key Dates

August 22 (Thu)	Class begins; late enrollment fee applies
August 27 (Tue)	Last day to register or add a class
September 3 (Tue)	Last day to drop a class or withdraw from the University without a W grade
October 14–15 (M–Tu)	Fall break
October 29 (Tue)	Last day to drop a class or withdraw from the University without final grades
November 27–29 (W–F)	Thanksgiving break
December 5 (Thu)	Last day of class
December 12 (Thu)	MthS 4120/6120 Final Exam (8:00–10:30am)

The official statement on Academic Integrity

As members of the Clemson University community, we have inherited Thomas Green Clemson's vision of this institution as a *high seminary of learning.* Fundamental to this vision is a mutual commitment to truthfulness, honor, and responsibility, without which we cannot earn the trust and respect of others. Furthermore, we recognize that academic dishonesty detracts from the value of a Clemson degree. Therefore, we shall not tolerate lying, cheating, or stealing in any form.

When in the opinion of a faculty member, there is evidence that a student has committed an act of academic dishonesty, the faculty member shall make a formal written charge of academic dishonesty including a description of the misconduct, to the Dean of the Graduate School. At the same time, the faculty member may, but is not required to, inform each involved student privately of the nature of the alleged charge.