

Syllabus - Fall 2017

NC STATE UNIVERSITY

Math 407 Modern Algebra

TuTh • 1:30 PM - 2:45 PM • 1218 SAS Hall

Instructor: Radmila Sazdanovic

Email: rsazdanovic@math.ncsu.edu

Office: SAS 3120

Office Hours: TBA or by appointment

Course materials:

- **Textbook:** *Contemporary Abstract Algebra: 9th Edition* by Joseph Gallian, Brooks Cole, ISBN 978-1305657960 (earlier editions available online for free)
- **Course Website:** Announcements, syllabus, and other class materials will be made available on moodle or via email.

Prerequisite: MA 225

Course Goals: Students will improve their ability to write proofs and communicate mathematical ideas correctly. Modern algebra is the study of the structure of sets with operations on them. Common operations such as addition and multiplication are generalized to apply to sets such as matrices or polynomials.

Contents: Topics include: Groups, isomorphism theorems, generators and relations, group actions, fundamental theorem of finite abelian groups, and introductory ring and field theory.

Homework: Homework assignments will be posted on the course webpage and/or distributed in class, typically every week. Problem sets are due on Tuesdays at the beginning of class. If you can not make it to class, put it in my mailbox before the due date.

Each homework consists of a reading assignment from the book, a list of exercises, and a list of problems. You are expected to complete all the “exercises”. Doing the full assignment is absolutely crucial! Late homework is generally not accepted.

You are welcome to work in groups, exchange ideas and help each other understand how to approach problems, but the work you turn in must be your own! You can use other resources to solve the problems, but all of them must be cited in your homework (this includes Wikipedia and Google as well as the names of other students you have worked with on an assignment).

Homework must be legible, well-organized, and written in complete sentences. You are encouraged to type up the problems in **LaTeX** (Overleaf, Sharelatex).

Attendance: Participation in class activities, group work, and class discussions will be a key contributor to your understanding of the material. Participation will be used to determine borderline grades. **Class attendance is strongly encouraged.** However, the University attendance policy will be followed. See: <http://www.ncsu.edu/policies/academic-affairs/courses-undergrad/REG02.20.3.php>

Important dates:

- Test I, October 3rd, in class.
- Test II, November 7th, in class.
- Final exam, Tuesday December 5, 1-4 PM SAS 1218

Grading:

- 20%:** Homework
- 25%:** Test I
- 25%:** Test II
- 30%:** Final Exam: cumulative, comprehensive.

Regrades: All regrade requests should be directed in writing. Regrade requests will not be accepted more than one week after the relevant assignment was returned to you, nor after the final exam.

Accommodations for Disabilities: Reasonable accommodations will be made for students with verifiable disabilities. In order to take advantage of available accommodations, student must register with the Disability Services Office <http://www.ncsu.edu/dso>, 919-515-7653. For more information on NC State's policy on working with students with disabilities, please see the Academic Accommodations for Students with Disabilities Regulation at <http://policies.ncsu.edu/regulation/reg-02-20-01>.

Non-Discrimination Policy: NC State University provides equality of opportunity in education and employment for all students and employees. Accordingly, NC State affirms its commitment to maintain a work environment for all employees and an academic environment for all students that is free from all forms of discrimination. Discrimination based on race, color, religion, creed, sex, national origin, age, disability, veteran status, or sexual orientation is a violation of state and federal law and/or NC State University policy and will not be tolerated. Harassment of any person (either in the form of quid pro quo or creation of a hostile environment) based on race, color, religion, creed, sex, national origin, age, disability, veteran status, or sexual orientation also is a violation of state and federal law and/or NC State University policy and will not be tolerated. Retaliation against any person who complains about discrimination is also prohibited. NC State's policies and regulations covering discrimination, harassment, and retaliation may be accessed at <http://policies.ncsu.edu/policy/pol-04-25-05> or http://www.ncsu.edu/equal_op/. Any person who feels that he or she has been the subject of prohibited discrimination, harassment, or retaliation should contact the Office for Equal Opportunity (OEO) at 919-515-3148.

Code of Academic Integrity: Students are required to comply with the university policy on academic integrity found in the Code of Student Conduct found at <http://policies.ncsu.edu/policy/pol-11-35-01>.

Class Evaluations: Online class evaluations will be available for students to complete during the last two weeks of class. Students will receive an email message directing them to a website where they can login using their Unity ID and complete evaluations. All evaluations are confidential; instructors will never know how any one student responded to any question, and students will never know the ratings for any particular instructors.

Modifications to This Document: This document may be modified as needed throughout the course. Changes will be announced.

NCSU Mathematics Department

MA 407H – Introduction to Modern Algebra for Math Majors

Fall 2017, TuTh 1:30-2:45, SAS 1218

Instructor: Radmila Sazdanovic

Tentative Schedule

Lecture	Chapter	Title	Contents
1	0	Preliminaries	integers, modular arithmetic, induction, equivalence relations, functions
2-3	1	Introduction to Groups	symmetries of a square, dihedral groups, cyclic rotation groups
3-4	2	Groups	definitions, examples, elementary properties
5-6	3	Finite Groups	terminology, notation, subgroups, examples
6-7	4	Cyclic Groups	properties, subgroups, classification
7-8	5	Permutation Groups	definition, notations, cyclic notation, properties
9-10	6, 10	Isomorphisms and Homomorphisms	motivation, definition, examples, Cayley's theorem, properties, automorphisms, first isomorphism theorem
11-12	7	Cosets and Lagrange's Theorem	definition, Lagrange's theorem, applications, rotation groups
12-13	9	Normal Subgroups and Quotient Groups	definitions, applications, internal direct product
14 15-16	8	Test 1 External Direct Products	definition, examples, properties, group of units mod n , applications
16-17	11	Fundamental Theorem of Abelian Groups	statement, isomorphism classes, examples

18-19	12	Introduction to Rings	motivation, definitions, examples, properties, subrings
19-21	13	Integral Domains	definition, examples, fields, characteristic
22-23	14	Ideals and Quotient Rings	ideals, quotient ring, prime ideals, maximal ideals
24		Review	
25		Test 2	
26	15	Ring Homomorphisms	definition, examples, properties, field of quotients
27-28	16	Polynomial Rings	notation, division algorithm, consequences
29-30	17	Factorization of Polynomials	reducibility, unique factorization domains
31-32		Review	
December 6	1-4 p.m.	Final Exam	