Math 361: Abstract Algebra

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Office Hours Monday, Wednesday, Friday 11 am - noon, Thursday 11:45 am - 1 pm, or by appointment.

Course Description This course is an introduction to modern abstract algebra which focuses primarily on groups, rings, and fields. We will see many examples of these both familiar and unfamiliar, and learn how to generalize our ideas of addition, multiplication, and division to new settings. Along the way, students will practice creating, analyzing, and communicating logically reasoned arguments.

Learning Outcomes By the end of this course, successful students will be able to:

- Construct a valid proof that proceeds efficiently from hypotheses to conclusion
- Use basic definitions and properties of groups and rings
- Investigate basic properties in a wide range of algebraic examples
- Effectively communicate mathematical results both in writing and in presentations

Course Materials *Contemporary Abstract Algebra*, Joseph Gallian, 9th Edition

Important Dates

We will have two take-home tests and a take-home final exam (essentially a third test). Their due dates are listed below.

Test 1	**Monday 9/30, start of class**
Test 2	**Monday 11/4, start of class**
Final Exam	**Wednesday, 12/11, by 5 pm**

Course Grades The final course grade is determined in the following way:

Quizzes/MCSP Conversations	**10%**
Written Homework	**25%**
Participation (including presentations)	**20%**
Tests (15% each)	**30%**
Final Exam	**15%**

A grade scale will be determined after final grades are computed, but will be no worse than the scale given below.

		B+	87-89	C+	77-79	D+	67-69		
A	93-100	B	83-86	C	73-76	D	63-66	F	0-59
A-	90-92	B-	80-82	C-	70-72	D-	60-62		

Course Format

This class will be about half lecture and half workshop and student presentations. Each section of the course will follow the same week-long cycle. The first day of each cycle will be an intro lecture day, after which practice problems, written homework, and presentation problems will be assigned for the week. The second day will start with our quiz, after which we'll discuss questions on the material and prepare for presentations. The final day will be student presentations.

Quizzes

We will have a short weekly quiz (usually on Wednesday) where you will be asked to about basic definitions and theorems. These quizzes are to help you stay caught up on new vocabulary and important ideas, since it is impossible to understand what is happening in class or write good proofs if you are not clear on the definitions of the words being used or the names of theorems being cited.
No make up quizzes will be given, but at the end of the semester I will drop your lowest quiz score.

MCSP Conversations The MCSP department offers a series of talks designed to appeal to a broad audience. Members of this class are encouraged to attend many of these meetings, however attending at least three talks is mandatory. Within one week of attendance you must submit your response to the talk. Each response will count as one quiz grade.

Dates	Topic	Notes
8/28 - 8/30	Chapter 0: Preliminaries	
9/2 - 9/8	Chapter 1 / Chapter 2: Groups	
9/9 - 9/13	Chapter 3: Finite Groups	
9/16 - 9/20	Chapter 4: Cyclic Groups	
9/23 - 9/27	Chapter 5: Permutation Groups	**Test 1 assigned 9/23**
9/30 - 10/3	Chapter 6: Isomorphisms	**Test 2 due 9/30**
10/7 - 10/11	Chapter 7: Cosets, Lagrange's Theorem	
	Fall Break	
10/21 - 10/25	Chapter 8: External Direct Products	
10/28 - 11/1	Chapter 9: Normal Subgroups, Factor Groups	**Test 2 assigned 10/28**
11/4 - 11/8	Chapter 10: Group Homomorphisms	**Test 2 due 11/4**
11/11 - 11/15	Chapter 12: Rings / Chapter 13: Integral Domains	
11/18 - 11/22	Chapter 14: Ideals, Factor Rings	
11/25 - 12/6	Chapter 15: Ring Homomorphisms	**Final assigned 12/4**
Wed 12/11	**Final Exam due at 5 pm**	

Written Homework There will be a written homework set due at the end of every weekly cycle. Homework is due at the beginning of class on the day we start the next cycle. **No late homework will be accepted.** I encourage you to work with your classmates on the mathematics of these assignments, but you must write up your solution independently. (This means you should not look at anyone else's write-up or let anyone else see yours.) You may not work on homework with anyone besides me and your classmates.

Presentations On the final day of each topic cycle, pairs of students will present solutions to problems from that section. I will assign pairs and problems on the first day of each cycle. These are graded only on participation, and my expectations are: that you go to the board having thought seriously about the problem beforehand, be able to talk clearly about the ideas being discussed, and either solve the problem yourself or facilitate a class discussion to solve it. This means even if you are not at the board you can participate by helping your classmates if they get stuck.

Participation

As we work through the course material, I expect you to come to class prepared and willing to contribute to our progress. There will be many ways to do this, including: working on problems during class time, supporting your peers during their presentations, joining class discussions, and asking good questions.

Attendance Policy

Class attendance is expected. If you do have to miss class, you are responsible for learning all material covered that day. If you have not discussed your absence with me beforehand, you will be unable to make up any work missed and it will negatively impact your participation score.

Special Needs If you have a disability that may require an accommodation in this course, please provide me with your documentation within the first 2 weeks of the semester. I must have your documentation at least 48 hours prior to any accommodation made. (Check with the Center for Teaching and Learning for their scheduling guidelines.)

Academic Integrity I expect all of you to follow the Academic Integrity policies of Roanoke College. All graded work should be your own work! If you ever have questions about how these policies apply to our class please contact me. Any violations of these policies will automatically be turned over to the Academic Integrity Council.

Course Schedule The following schedule is approximate and subject to change, but it should give you some idea of the timing of the topics covered and assignments.